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ORIGINAL COMMUNICATIONS.

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X-RAY STUDY OF MOVEMENTS OF THE TONGUE, EPIGLOTTIS AND HYOID BONE IN SWALLOWING, FOLLOWED BY A DISCUSSION OF DIFFICULTY IN SWALLOWING CAUSED BY RETRO-PHARYNGEAL DIVERTICULUM, POST-CRICOID WEBS AND EXOSTOSES OF CERVICAL VERTEBRAE.*

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The following lantern slide paper divides itself naturally into two parts. The first is rather academic and deals with the movements of the tongue, the hyoid bone and the epiglottis in swallowing as shown by the X-ray and the fluoroscope. The second is clinical and so perhaps more important. It treats of retropharyngeal diverticulum, postcricoid webs, the reaction of the postpharyngeal space to infection and ends by considering exostoses of the cervical vertebrae as a cause of difficulty in swallowing. Retropharyngeal diverticula or pouches of the upper end of the esophagus have long been known. The best surgical procedure for dealing with them, however, has been arrived at only of late. The cause of retropharyngeal diverticulum has never been given satisfactorily. I have to offer today two probable causes for the formation of these pouches. I shall not take up the question of surgical treatment. It is now a good many years ago since I began writing about webs at the mouth of the esophagus. I am convinced that they are often overlooked. My experience has also convinced me that the treatment of webs of the upper end of the esophagus is one of the most satisfactory chapters in esophageal

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surgery. Two years ago I put on record the first cases of exostoses of the cervical vertebrae associated with difficulty in swallowing. Such cases are becoming more common in our clinic. The knowledge of their existence is necessary for the safe examination of lesions at the mouth of the esophagus. In short, the presence or absence of exostoses should be noted before an examination of the esophagus is attempted with rigid tubes.

The observations on swallowing were made with barium milk, sometimes thickened with bread. No observations, however, were made with a thick bolus of food, like meat. Nature intended that all food should be minced by chewing and swallowed in a fluid or semi-fluid state. All the X-rays were taken by Dr. Macmillan, Roentgenologist at the Massachusetts Eye and Ear Infirmary. The series of X-rays on the tongue, the epiglottis and the hyoid bone he took upon himself in order to get a highly intelligent and co-operative patient. This, therefore, in many ways is a joint paper.

THE TONGUE IN SWALLOWING.

In swallowing the first movement of the tongue is the depression of the tip. This makes a pocket between the tip of the tongue and the back of the teeth. In this the barium first accumulates. Next the dorsum of the tongue is hollowed out slightly and the barium flows into this depression. Then the tip of the tongue is carried to the roof of the mouth against the teeth and is held there from now on, thus preventing the barium from escaping forward. As the tip of the tongue comes up the base of the tongue is depressed. In the next stage the base is depressed still more—the anterior half of the tongue, however, goes to the roof of the mouth. The barium is now caught between the base of the tongue, the anterior half of the body of the tongue and the posterior pharyngeal wall. At this point the base of the tongue is seen to dart backward like the plunger of a piston and the barium is shot downward.

The next slide shows the movements of that part of the base of the tongue which projects below the horizontal ramus of the lower jaw. Summarized, they are as follows: At first there is a very considerable space between the back of the tongue and the posterior pharyngeal wall. The base of the tongue moves upward and backward until the tongue is nearly lost behind the ramus of the jaw and the base of the tongue finally strikes the posterior pharyngeal wall. The tip of the epiglottis is at first free from the base of the tongue, but as the tongue moves upward and backward it comes to lie against the tongue and when the tongue finally strikes the posterior pharyngeal wall it forces the tip of the epiglottis also against this wall.

A series of retouched tracings of X-ray films showing the movements of the tongue in swallowing.

1. The tip of the tongue is depressed and the barium accumulates above and in front of the tip and behind the teeth.

2. The tip of the tongue comes up and the dorsum of the tongue sinks.

3. The tip of the tongue remains up. The dorsum and the base sink. The dorsum of the tongue becomes an inclined plane which slants downward from before backward.

4. The anterior half of the tongue rises as a globular mass to the roof of the mouth. The base of the tongue is depressed further. The patient now has the maximum mouthful.

5. The anterior half of the tongue remains at the roof of the mouth. The posterior half and the base of the tongue rise and are seen under the fluoroscope to shoot suddenly backward, driving the barium quickly down the pharynx.

This series of films Dr. Macmillan took upon himself.

Fig. No. 1.

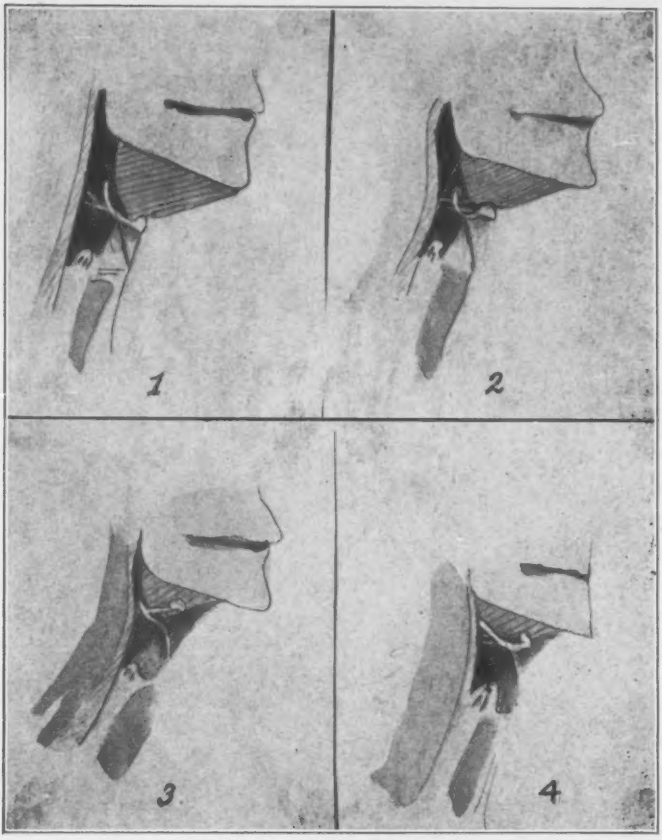

Fig. No. 2.

A series of retouched tracings of X-ray films to show the movements of the root of the tongue, the hyoid bone and the epiglottis in swallowing. This series Dr. Macmillan took on himself.

Tracing No. 1 shows the epiglottis separated from the root of the tongue and a wide space between the root of the tongue and the posterior pharyngeal wall.

The other tracings show the gradual elevation of the root of the tongue and the hyoid bone, the application of the epiglottis to the root of the tongue, and the backward movement of the root of the tongue and the epiglottis until both are in contact with the posterior pharyngeal wall.

If the patient swallows only a moderate amount so that the barium does not obscure all of the landmarks it will be seen in the antroposterior view either through the fluoroscope or on the X-ray plate that

the barium accumulates in the valleculae at the base of the tongue. The epiglottis acts as a water shed and divides the stream into two, a stream running down on either side of the base of the tongue into the right and left pyriform sinuses. Below the pyriform sinuses the two streams quickly unite, but it takes a fortunate plate to catch this union. The stream is narrow back of cricoid cartilage but below this

Fig. No. 3.

Retouched tracing from X-ray plate. Anteroposterior view. The plate shows the course taken by barium in normal swallowing. The barium first pools in the valleculae at the base of the tongue. Then it runs down the sides of the tongue and pools in the right and left pyriform sinuses reaching the middle line of the neck in front. The streams from the pyriform sinuses unite below the cricoid cartilage into one stream. See Fig. No. 4. The patient must swallow a moderate mouthful of the barium, otherwise one pyriform sinus will contain more than the other and a picture similar to that given by asymmetry of the pyriform sinuses or by a web in one sinus will be obtained.

the esophagus at once balloons to its full width. In the lateral view the stream of barium is seen to behave in the same way, that is, it accumulates at the base of the tongue, runs in a thin stream down the side of the tongue, accumulates in the pyriform sinus (only one sinus being seen if the view is directly lateral) and runs back of the cricoid also in a thin stream. In continuous swallowing the barium not only runs down on either side of the epiglottis but cascades over it in a full stream. (See Fig. No. 13.)

THE EPIGLOTTIS IN SWALLOWING.

The men of my generation were taught that in swallowing the epiglottis turned downward and covered the opening of the larynx the same as a lid covers a box, and was the important factor in the

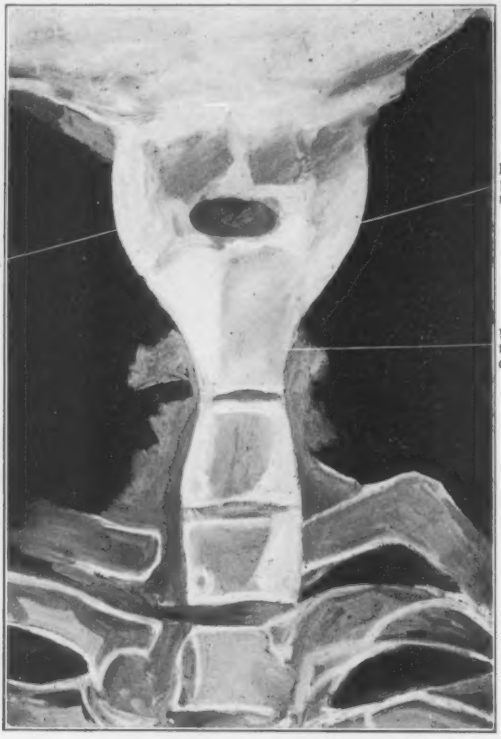

Fig. No. 4.

Retouched tracing from a lantern slide projection, the slide having been made from the original X-ray film.
The drawing shows both pyriform sinuses filled simultaneously with barium and the two streams uniting into one below the cricoid cartilage. This is the normal course followed by liquids when swallowed. Unless care is taken to have the patient swallow a good sized mouthful there will not be enough to fill both pyriform sinuses at once and a false inference about the patency of one pyriform sinus may be drawn (Macmillan).

closure of the larynx. Later, observations were made which discredited the importance of the role which the epiglottis seemed to play in closing the larynx. Both the fluoroscope and the X-ray film show that the epiglottis does actually turn downward to cover the

larynx. Not only this, plates taken of the tongue in swallowing show that the epiglottis rises with the base of the tongue, becomes applied to it and finally is forced back against the posterior pharyngeal wall. (See Fig. No. 2.) This point was new to me until I saw it in the fluoroscope and the X-ray. It is a well known fact that the

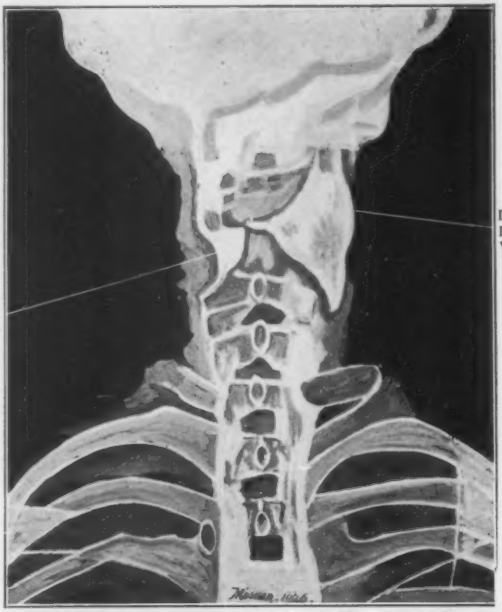

Fig. No. 5.

Retouched tracing from X-ray plate.

The patient was a young man, age 30 years, who some months before had infantile paralysis. At the time he came for examination he had a paralysis of the left half of the soft palate, the left half of the pharynx and the left vocal cord.

The film shows a great difference in the size of the two pyriform sinuses, the left being much larger owing to the fact that the muscular paralysis did not force the barium through it. The bulging of the lateral pharyngeal wall above the sinus is shown. Only the lower part of the large shadow on the left is pyriform sinus, the upper half being pharynx.

epiglottis varies greatly in length, and it is also well known that in many instances the tip turns permanently forward. The explanation for this, I feel, is that the constant striking of a long epiglottis against the posterior pharyngeal wall results finally in a permanent forward bend of the tip.

It is not uncommon to find what is called an omega-shaped epiglottis. It is usually short and is often asymmetrical, that is, it is placed to one side of the median line. Obviously in such cases it cannot spread out over the pharynx like the more common flat epiglottis. Experimenting with a cadaver specimen of a larynx in which the epiglottis was omega-shaped and to one side of the median line, I came to the conclusion that in order to close the larynx the epiglottis would have to straddle the arytenoid and the arytenoid epiglottidean

Fig. No. 6.

Drawing from a wet specimen of a human larynx in which the epiglottis is not flat and broad, as in most cases, but is folded on its vertical axis and is narrow and short,—omega epiglottis.

fold of the side to which the epiglottis was asymmetrical. Manipulation of this specimen showed that this actually happened when the epiglottis was forced downward. One-half of the epiglottis fell into the opening of the larynx, the other half outside, but the closure of the larynx from the mechanical standpoint was complete.

THE MOVEMENT OF THE HYOID BONE IN SWALLOWING.

Like the epiglottis the hyoid bone, or rather the body of hyoid bone, follows the upward movement of the tongue because it is attached to its base. X-ray plates show that the body of the hyoid bone moves

upward the width of one cervical vertebra. The great horns of the hyoid bone, however, are forced back against the posterior pharyngeal wall and remain stationary, the chief movement being an upward tilting of the body of the bone. This partial fixation of the hyoid is probably necessary in order to get the epiglottis quickly back in place after its downward excursion. Otherwise, it would constantly embarrass breathing.

Fig. No. 7.

This is the same larynx as shown in Fig. No. 6. The omega-shaped epiglottis has been pushed down. The epiglottis is not long enough to project over the larynx like a lid. It protects the entrance to the larynx by straddling the left arytenoid and the left artenoepiglottidean fold. From the mechanical standpoint this makes a good closure of the opening of the larynx, especially if it is reinforced, as it is in the living, by the sphincter-like action of both arytenoepiglottidean folds.

Fig. No. 8 shows the movement of the hyoid bone just described. It is hard to get a plate of the epiglottis when it is turned down over the larynx because it moves so quickly. It is easy, however, to see this in the fluoroscope. Fig. No. 8 also shows the movement of the arytenoids in swallowing. I have already said that the epiglottis does act as a cover for the larynx in swallowing. It is well known clinically that the epiglottis can be removed, that is, the upper half, and difficulty does not result. If, however, the base or the cushion of the

epiglottis is interfered with as in certain cases of thyrotomy, then difficulty in swallowing results. Modern physiologists maintain that the closure of the larynx in swallowing is brought about chiefly by the approximation of the tips of the arytenoids to the base or the cushion of the epiglottis. This closure is made complete by a sphincter-like action of the arytenoepiglottidean folds, or rather by the

Fig. No. 8.

Retouched tracings from X-ray films taken to show the movement of the root of the tongue, the epiglottis and the hyoid bone in swallowing.
The first illustration shows the tongue, the epiglottis and the hyoid bone in the resting position.
The root of the tongue is well below the angle of the jaw. There is a wide space between the root and the base of the tongue and the posterior pharyngeal wall. The body of the hyoid bone is well below the great horns which slant upward and backward. The tips of the great horns rest against the posterior pharyngeal wall opposite the top of the fourth cervical vertebra. The arytenoid cartilage is far away from the cushion of the epiglottis and the larynx is wide open.
The second illustration is taken during swallowing. Both the body of the hyoid bone and the arytenoid have risen the height of one vertebra. The hyoid bone is horizontal. The tips of the great horns are approximately in the same place. The bone changes its position by an upward movement of the body. The root of the tongue touches the pharyngeal wall, and the backward movement of the tongue has forced the tip of the epiglottis also against the pharyngeal wall. The arytenoid cartilage has approached the cushion of the epiglottis. See Fig. No. 10.

small muscular stripes running in these folds from the transverse arytenoid muscle. In animals who swallow with the head down, that is, against gravity, the epiglottis is large and folded, nature's object apparently being to have the epiglottis constantly on its mark, ready to start the closure of the larynx in swallowing. Fig. No. 8 in the second figure shows the approach of the arytenoid to the cushion of the epiglottis during the act of swallowing. Therefore, I feel we have X-ray proof that both theories are correct, namely, that the epiglottis

does act as a cover for the larynx during swallowing and the arytenoids are approximated to the cushion of the epiglottis. (See Fig. No. 10.)

Having obtained the above records of the movements of the tongue, the epiglottis and the hyoid bone in swallowing, I was fortunate in being able to plate two cases of bulbar paralysis. In this disease the tongue lies motionless in the mouth and the patient swallows by

Fig. No. 9.

Plate showing the normal X-ray anatomy of the root of the tongue, the hyoid bone, the epiglottis, and the larynx. This is the resting position of the tongue before swallowing begins and carries its base upward and backward.

gravity. The first patient was a woman. She had the usual muttering speech (potato voice) and constantly dribbled saliva from the corners of her mouth. The plate showed that the barium accumulated beneath the tongue and reached the pharynx by running backward on the floor of the mouth. All this time the tongue lay motionless.

Still another patient, a man, gave the same findings. The barium having run along the floor of the mouth beneath the tongue as in the first case, accumulated in the valleculae and then ran down the sides

of the tongue into the right and left pyriform sinuses. It was stopped by the sphincter which closes the mouth of the esophagus. The plates show that it fell down the pharynx by gravity and did not touch the postpharyngeal wall. This man suffered not only from bulbar paralysis, but from another disease, namely, a full beard. This was constantly wet from drooling saliva and immediately became

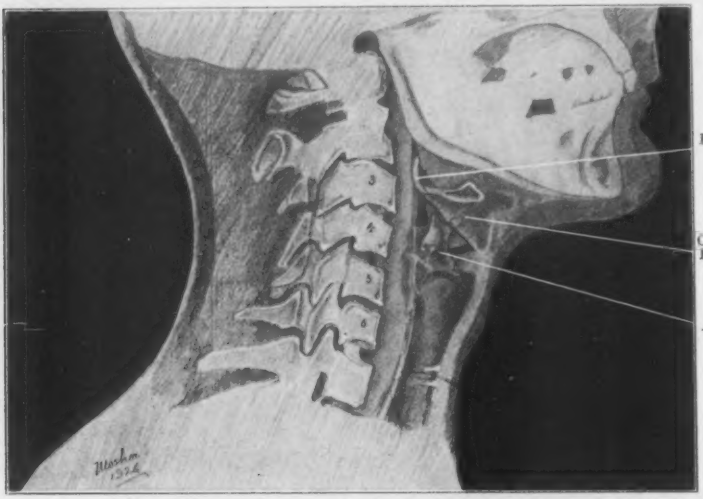

Fig. No. 10.

Retouched tracing from a lateral film of the neck of a normal young woman. The film was taken at the beginning of the act of swallowing in an attempt to show the closure of the larynx by the approximation of the tips of the arytenoids to the cushion of the epiglottis. Previous trials had shown, see Fig. No. 8, that the arytenoids approached the cushion of the epiglottis. This plate shows them in actual contact.

The hyoid bone is in its extreme upper position. The root of the tongue and the upper half of the epiglottis are against the posterior pharyngeal wall.

The essential thing in the closure of the larynx is the approximation of the tips of the arytenoids to the cushion of the epiglottis plus the sphincter-like action of the arytenoepiglottidean folds. The epiglottis turns downward in swallowing and if it is long enough and wide enough it acts as a lid and to a certain etxent protects the opening of the larynx.

In animals the epiglottis is probably more essential for the closure of the larynx. In man the mobile part of the epiglottis—the upper half—can be removed without interfering with the closure of the larynx. If, however, the cushion or the lower half of the epiglottis is interfered with there is mis-swallowing; in other words, food and fluid get into the larynx.

white and dripping from the barium. As he couldn't talk, Dr. Herman had the inspiration to ask him if he could sing. Through his interpreter he replied that he could. Accordingly he sang the Portugese national hymn through this unlovely mess. "And a good time was had by all."

ASYMMETRY OF THE THYROID CARTILAGE.

The two halves of the thyroid cartilage are often asymmetrical, that is, one half is larger than the other and one side hugs the cricoid cartilage more closely than the other. The whole larynx is markedly askew, the antroposterior diameter slanting strongly to the right or

Barium on floor of mouth

Fig. No. 11.

Retouched tracing from a lantern slide projection.
The patient was a woman, age 50 years, who had bulbar paralysis. She had the typical speech. Saliva was constantly dribbling from her mouth. When she attempted to drink, a part of the liquid escaped at the corners of her mouth. Fluoroscopy showed that the tongue was practically motionless. The film shows the barium running under the tongue on the floor of the mouth, reaching the base of the tongue by gravity, not by the assistance of the tongue. See Fig. No. 12.

left. In such cases one pyriform sinus is smaller than the other, at times almost obliterated. I have found on the cadaver a number of instances in which asymmetry of the thyroid cartilage was associated with asymmetry of the mouth of the esophagus. That is, on the side of the narrow or obliterated pyriform sinus one half of the mouth of the esophagus was obliterated. A number of years ago I made the observation that pharyngeal diverticula of the esophagus

were often associated with asymmetry of the mouth of the esophagus. In fact, I have had five consecutive cases of pharyngeal diverticula in which the mouth of the esophagus was obliterated for one half of its transverse diameter. It seemed to me, therefore, that this asymmetry of the mouth of the esophagus was probably a cause in the formation

Fig. No. 12.

Retouched tracing from a lantern slide projection.
The patient was a man who had bulbar paralysis. As in the woman with bulbar paralysis the barium ran along the floor of the mouth under the tongue and then dropped down the pharynx by gravity. The barium does not reach the posterior pharyngeal wall; in other words, the superior constrictor is paralyzed and does not contract down on it.

of the pouch. In such instances the force exerted on the esophagus in swallowing would be off center. The well known weak triangle in the posterior wall of the esophagus opposite the cricoid cartilage would be under undue strain and in time would give way, allowing a hernia of the esophageal mucous membrane through it. For years I have had the feeling that there might be an embryological back-

Fig. No. 13.

Retouched tracing from a lantern slide projection. The film was taken from the same patient shown in Fig. No. 12. In this film the barium is seen collecting in the vacullae at the base of the tongue, and then in the pyriform sinuses. It does not enter the esophagus because the sphincter at the mouth of the esophagus is not paralyzed.

Fig. No. 14.

Cast from a frozen section—adult, showing a very asymmetrical larynx. Beginning half-way down the posterior surface of the right half of the cricoid cartilage the mouth of the esophagus for a third of its transverse diameter is obliterated by adhesions springing from the cricoid cartilage.

ground for pharyngeal pouches of the esophagus. The pig has a pharyngeal pouch wihch persists through life. It seems to have something to do with housing the excessive tips of the arytenoids which are present in this animal. In the 12 m.m. pig there are two pharyngeal pouches. Later the upper one disappears. At my request Dr.

Fig. No. 15.

Drawing from the larynx and pharynx of a pig seen from behind. The drawing shows the large backward curving arytenoids. Below these is the opening of the pharyngeal pouch, which is normal in the pig. Lower down and between the two halves of the inferior constrictor—the upper half springing from the thyroid cartilage and the lower half from the cricoid—appears the sac-like ending of the pouch.

The illustration shows how the tips of the arytenoids are in position to project into the mouth of the pouch. In a median antroposterior section of a frozen pig's head the tips of the arytenoids are actually housed in the mouth of the pouch.

Boyden examined specimens of the human embryo of corresponding ages and found that there are two analagous pharyngeal pouches in man. The lower one actually forms a small pouch for a short time and then disappears. The lower embryonic pouch in man is in the

corresponding place of the lower and persisting pouch of the pig, and both the lower embryological pouches of man and pig are in the location in which esophageal pouches are found in man.

Dr. Boyden reported as follows: "There are two pharyngeal bursae in pig embryos which for convenience I will designate A and B. The upper one (A) is present in embryos of 6 m.m. (see Model No. 53 on third floor of this building), but disappears soon after the 12 m.m. stage; it lies on the roof of the pharynx midway between the third pair of pharyngeal pouches at the point where the roof of the pharynx makes a sharp bend. The lower bursa (B) is identical with the pouch which you showed me in the adult pig; it first appears

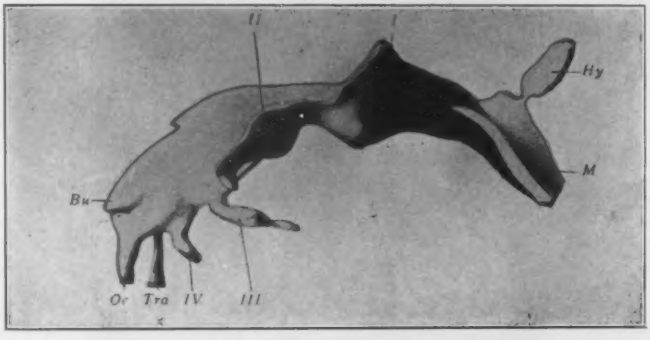

Fig. No. 16. Pig, 12 m.m. Sagittal Series 7.

Wax reconstruction by J. L. Bremer.
Bu, Pharyngeal bursa. Hy, Hypophysis. M, Mouth-cavity. Oe, Oesophagus. Tra, Trachea. I, II, III, IV, Gill-pouches developed as lateral pouches of the pharynx. X 40. Minot's Embryology.
Above the pharyngeal bursa, not lettered but shown in the cut, there is another or the first pharyngeal pouch springing from the pharyngeal wall. The upper pouch disappears, but the lower one, called the pharyngeal bursa, persists throughout the life of the pig.
Two pharyngeal pouches similarly placed (Boyden) exist in the human embryo. In the 15 m.m. human ebryo the lower diverticulum is still present as a distinct pouch. Shortly after this it disappears. Both pouches disappear in man. See Fig. No. 17.

about the 12 m.m. stage but does not become conspicuous much before the 15 m.m. stage. It therefore arises considerably before the laryngeal cartilages.

"Apparently both these diverticula are present in human embryos. (A) has been noted in a 7.5 m.m. human embryo in our collection, but as in the pig, it disappears early—some time before the 10 m.m. stage. Divericulum B, so far as I know, has never been reported before. It occurs at the same place as in the pig (at the pharyngeal end of the esophagus) and at about the same time. But it differs in

shape and is transitory, since I cannot find it in embryos older than 18.8 m.m. Nor is it present in the other mammalian embryos of the Harvard collection, namely, in the sheep, deer, cow, rabbit, guinea pig, rat, cat, dog and opossum." (Boyden.)

Two factors, therefore, probably play a part in the formation of retropharyngeal pouches in man. First, there is an embryological tendency to the formation of such a pouch, and second, asymmetry of the mouth of the esophagus brings undue pressure upon an embryologically and anatomically weak spot of the esophagus.

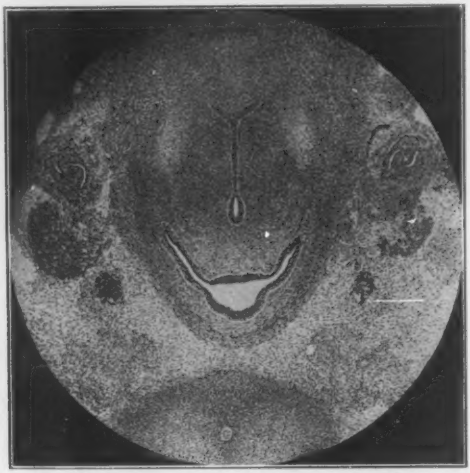

Fig No. 17. (15 m.m. human embryo, H. E. C. 2051—transverse section N407—photomicrograph. X 59.)

15 m.m. human embryo showing a pharyngeal bursa or diverticulum. This diverticulum occupies the same relative position as the pharyngeal bursa of the pig (Boyden). It soon closes.

WEBS OF THE UPPER END OF THE ESOPHAGUS AND WEBS OF THE PYRIFORM SINUSES AND POSTCRICOID WEBS.

Bilateral webs, I feel, are probably congenital. Other webs, especially if single, or behind the cricoid cartilage or just below the cricoid cartilage, are due to some condition which has given an ulceration of the esophageal mucous membrane. Trauma, of course, can cause these ulcerations. So can almost any of the infections which involve the mouth, the pharynx and by extension the upper esophagus.

Single webs as I have found them have been most often on the right. Some of them were very slight and would hardly be called webs at all were it not for the fact that their removal does away with the patient's difficulty in swallowing. Other webs are stout, sturdy affairs and form the inner boundary of a good-sized pocket. For instance, the one shown in the slide bounded a pocket which was half-an-inch deep. The web itself was of the same measurement vertically. These webs run from the side of the cricoid cartilage anywhere from the top to the bottom. Occasionally a circular web with a central opening is found at the bottom of the cricoid cartilage. Of late Dr. Macmillan has been finding a number of web-like strictures about an inch below the lower edge of the cricoid cartilage. He feels that we have much yet to learn about strictures so placed.

The larger the web and the deeper the pocket made by it in the pyriform sinus, the greater the symptoms. Even small webs give definite symptoms. I believe that many a so-called case of globus hystericus is simply a case of a web in the pyriform sinus or behind the cricoid cartilage.

Webs which entirely encircle the esophagus and which have a small central opening give, of course, very great difficulty in swallowing. The patient may be semi-starved by it. These are very dramatic cases because the divulsion of the web at once restores normal swallowing.

Such webs if suspected and watched for in the examination are not easily missed. Small webs, on the other hand, are very easy to pass over. A large examining tube must be used to find them. The symptom which I have found to be oftenest associated with the presence of a web is strangling in eating. The pocket made by the web fills with fluid and this slops over into the larynx, causing spasm. In slight webs the only symptoms often are a sense that something sticks high in the throat and that the patient strangles on eating.

The X-ray will show these webs if the plate is made to include the side of the thyroid cartilage and the back of the cricoid cartilage. For a long time I did not realize this and the X-ray was a disappointment. The barium fills the pouch and sticks there a moment and the plate will show it.

Webs are punched out if they are strand-like affairs, as most of them are. If they take the form of a thin diaphragm with a small central opening they are easily divulsed.

As I look back upon the progress of esophageal surgery I cannot help feeling that the detection and removal of webs is one of the

marked advances. I am constantly finding webs and treating them with much satisfaction. In short, webs are among the most satisfactory of esophageal conditions to treat. From the standpoint of surgical reputation it pays to be on the watch for them.

THE RETROPHARYNGEAL SPACE.

I never realized until recently how very inflammable the tissue behind the upper part of the pharynx is. This can be seen best in lateral plates taken of foreign bodies lodged in the mouth of the esophagus. Even in cases where there is apparently no perforation the swelling back of the esophagus comes on speedily and gives a

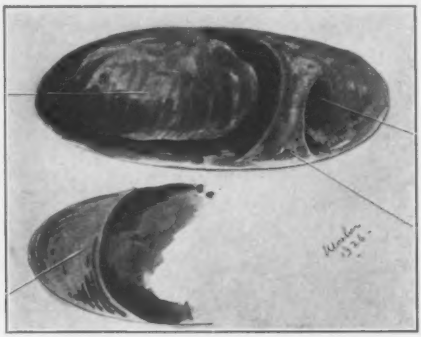

Fig. No. 18.

Findings by esophagoscopy in a woman, age 45 years, who had marked difficulty in swallowing.
The figure shows a very sturdy web on the right. This made the inner wall of a pocket a half-inch deep. The web was easily removed with a ring punch. The patient regained normal swallowing.
On the left there was a thin falciform web. There was no pocket associated with it. This second web was not considered of enough importance to remove it.

surprisingly broad shadow. Not only does it come on quickly, but it lasts days, if not weeks, after the removal of the foreign body. When you first notice this swelling you at once think of a beginning periesophageal abscess and of a lateral pharyngotomy for its evacuation. I have the slides of one dramatic case in which, when it reached our hospital, the esophagus was actually perforated and a retroesophageal abscess resulted. Naturally in this case the swelling was excessive.

The behavior of the postesophageal space is an index of the extent of the trauma to the esophagus and of the extent of the resulting inflammatory reaction.

EXOSTOSES OF THE CERVICAL VERTEBRAE.

It is easy to see that exostoses of the cervical vertebrae behind the cricoid cartilage could easily narrow this always narrow space and so cause difficulty in swallowing. I first recognized this condition two years ago and referred to it in a paper before the American Bronchoscopic Society. The lantern slides which illustrated the paper have never been put into cuts and printed. The case which led to

Swelling of postpharyngeal space

Fig. No. 19.

Retouched tracing from a lantern slide projection.
This plate shows the inflammatory swelling of the postpharyngeal structures a few days after the removal of a foreign body from the mouth of the esophagus. See Fig. No. 20.

the discovery of cervical exostoses as a cause of difficulty in swallowing has been followed for two years. The old lady on whom the observation was made came to me the other day again. She is now 80 years of age, in body but not in spirit. She is as sprightly as anyone could wish; that is, in spirit. In body, she is crippled. For years she has suffered from arthritis of both knees and can walk only by the use of braces on both legs. Two years ago she had a gastric upset. During this attack she vomited blood. After the attack she

noticed difficulty in swallowing. She could eat everything but had to chew her food very fine. Hasty eating was followed by choking. My snap diagnosis was cancer of the esophagus. I sent her for the routine X-ray, expecting that this diagnosis would be confirmed. The next morning at the hospital Dr. Macmillan met me with an air

Fig. No. 20.

Retouched tracing from a lantern slide projection.
The patient was a boy, age 3 or 4 years, who before entrance to the hospital, had had three attempts made to remove a toy battleship from the mouth of the espohagus. It was found on examination that there was a rupture of the esophagus. The foreign body was successfully removed (Dr. Motley). The film was taken after the removal. It shows excessive swelling of the postpharyngeal space and the presence of air or gas.
The presence of air or gas in the postpharyngeal space indicates rupture of the pharyngeal wall or of the esophagus. This sign was reported in the literature a few years ago. The observation should not be credited to the writer of this paper.

of surprise on his usually calm Scotch face. Perhaps I read his mind, because I had thought of the following possibility on the way home from the office. Could the arthritis in this case be associated with exostoses of the cervical vertebrae? I had in my collection of esophageal casts at the medical school four which showed large exostoses of the lumbar vertebrae. I had often wondered what

Fig. No. 21.

Retouched tracing from X-ray film.

The patient, a woman, age 78 years, complained of moderate difficulty in swallowing. She had suffered from arthritis of both knees for years, and was obliged to wear braces in order to walk.

The film shows sharp spur-like exostoses on the bodies of the fifth and sixth cervical veterbrae. There is another exostosis on the lower lip of the body of the third vertebra. The body of this vertebra shows extensive arthritic changes.

Two years later, that is, this year, the patient returned with very marked difficulty in swallowing. The X-ray film again showed the spurs. There was, however, a great increase of the calcification of the cricoid cartilage and the upper edge of the cartilage was tilted strongly backward, leaving a slit-like entrance to the esophagus.

This case was reported two years ago before the American Bronchoscopic Society and is believed to be the first one recorded.

influence such exostoses would have on the esophagus. I knew full well what would happen if an esophagoscope were forced by such exostoses. So I said to Dr. Macmillan, "Wait a minute, let me speak first." Then I asked, "Has this patient exostoses of the cervical vertebrae?" He answered, "Yes." Then we looked at the plates together. On the front surface of the bodies of the sixth and seventh

Fig. No. 22.

Retouched tracing of an X-ray film.
The film shows marked lipping of the lower edge of the sixth cervical vertebrae. Opposite this there is a constriction of the esophagus. There is thickening of the intervertebral disks. The patient, a woman, had moderate difficulty in swallowing. On esophageal examination by Dr. Herman a web was found at the site of the exostosis and divulsed. The woman regained normal swallowing.

cervical vertebrae there were two exostoses about an eighth-of-an-inch long. Each was triangular, with the sharp point forward. We decided that these spurs were the cause of the difficulty in swallowing. But how about the vomiting of blood? It seemed at the time a far-fetched explanation that during the vomiting the spurs pierced the esophageal wall and caused the bleeding. It was possible, of course, but was it probable? Only an examination of the esophagus would

rule out cancer. On account of the patient's age and the moderate difficulty in swallowing, the examination of the esophagus was not done. Three days ago now as I write the patient returned. She has lost a great deal of flesh. There has been no more bleeding. She has no pain. She has to eat with extreme care. In spite of this she

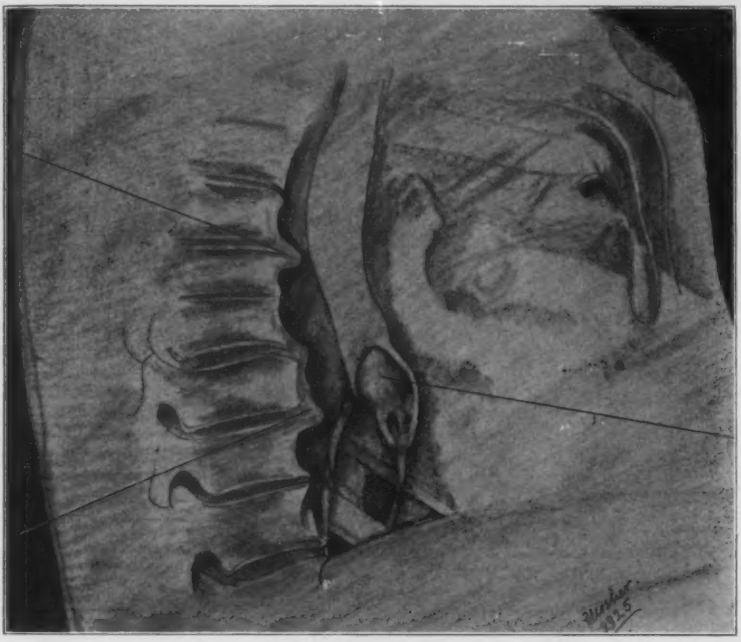

Fig. No. 23.

Retouched tracing of an X-ray film.
This is a lateral film of a man who during the gluttony attendant upon a drunken spree swallowed a large bolus of meat which failed to pass through the esophagus.
The film shows marked exostoses of the lower thoracic vertebrae. Opposite the lower exostosis the bolus of meat is seen lodged in the esophagus. Case of Dr. Greene.

strangles at almost every mouthful and has eaten as little as possible since I saw her last. Some time ago a friend recommended her to go to a stomach specialist in Philadelphia. This she did. A new X-ray was taken of her spine and she was assured that there were no exostoses on her vertebrae. The mirror examination of the larynx was negative, as at the first examination. However, on sliding the

larynx from side to side on the vertical column a very marked grating was elicited. A bit disturbed by the negative finding in Philadelphia, I sent the patient again to Dr. Macmillan with instructions to take the cervical spine, both knees and both mastoids. The patient had become hard of hearing and both drums were much thickened and had a marginal crescent of calcification of the lower half of the periphery.

Dr. Macmillan's report came back that the exostoses were still present, that they perhaps were a little larger. The posterior surface of the cricoid cartilage in the past two years, however, had become calcified and the entrance to the esophagus was reduced to a narrow chink. The knees showed very extensive arthritic changes, including spurs. Both mastoids were normal.

Fig. No. 24.

Findings by esophagoscopy in the case of a male, age 50 years, whose X-rays showed marked exostoses of the cervical vertebrae. Associated with the large exostosis there are two adhesions springing from the posterior esophageal wall.

The patient complained of slight difficulty in swallowing. The exostosis is off center and at the beginning of the esophagus so that food can get by it fairly well.

The pressure of the exostosis against the cricoid cartilage wore a thin place in the cartilage. In the first interpretation of the X-ray films it was thought that this pressure defect might be caused by a malignant tumor. See Fig. No. 25.

Here, then, is as pretty a first case as one could imagine. It is unusually complete because the patient returned after two years with a severe extension of the disease. During this time cancer was definitely ruled out. And the action of the spurs became plain beyond a doubt. After this first case put me on the track, other cases came to the hospital in which exostoses were shown by X-ray and webs of the esophagus associated with them were proved by the esophagoscope. (See Fig. No. 22.) Dr. Herman had the second case. In this a web associated with exostoses was demonstrated by examination. Two or three other cases soon followed. Then Dr. Greene had a case in which there were marked exostoses in the lower thoracic portion of the spine. (See Fig. No. 23.) A man who had been on a

spree got a piece of meat stuck in his esophagus. The X-ray showed large exostoses on the thoracic vertebrae. Being warned by the previous cases, Dr. Greene made his esophageal examination carefully. He recognized the exostoses and was able to slip his tube by them,

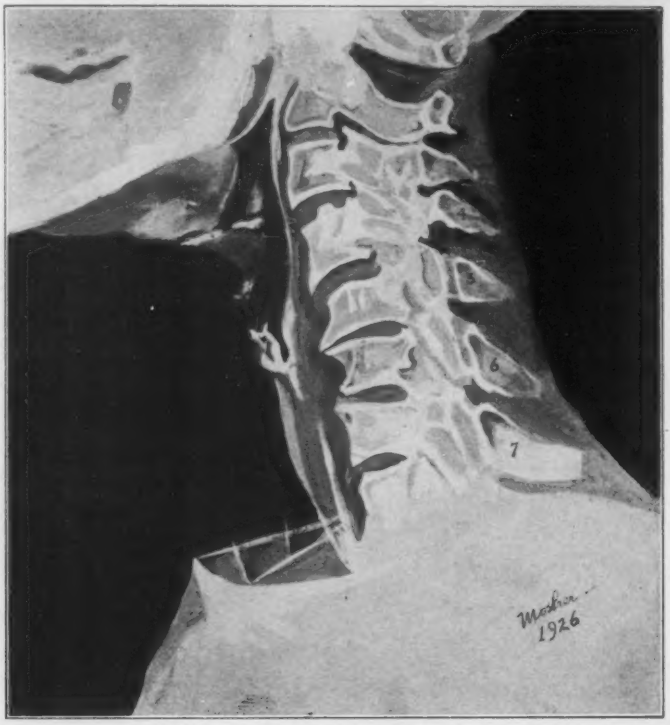

Fig. No. 25.

Retouched tracing from a lantern slide projection.
Lateral film of a man, age 50 years, who had slight difficulty in swallowing. There is marked lipping of the front edges of the bodies of the fourth, fifth and sixth cervical vertebrae. The intervertebral disks also are thickened. See Fig. No. 24.

but found no piece of meat. Just before the esophageal examination the man, on coming out of his spree, vomited copiously. During this performance the bolus of meat swallowed during his gluttinous drunk was expelled. Had it not been for the exostoses the bolus of meat would never in all probability have given trouble.

Just how the exostoses, which did not actually perforate the esophageal wall as in the first case, produced the webs which were found on examination I could not quite make out.

A short time ago another informative case fell into my hands. This was a man who had slight difficulty in swallowing. He came down with an attack of laryngitis and was examined by a specialist in his home town. The difficulty in swallowing led to the taking of an X-ray. (See Fig. Nos. 24-25.) This showed a defect in one-half of the thyroid cartilage, which led to the diagnosis of a possible tumor of the thyroid cartilage. When I saw the man his larynx was normal. He still complained of slight difficulty in swallowing. An X-ray of his cervical spine showed large exostoses. Examination under ether disclosed a large oval, bony mass on the front face of the sixth cervical vertebra. The tube could not be made to pass it. From the posterior surface of this mass or exostosis there were two well-marked fibrous adhesions running to the esophageal wall. Here was the proof which I was waiting for. The irritation of the bony tumor against the esophageal wall had caused two marked adhesions. This case proved to my mind that exostoses could cause webs of the esophagus.

It will be interesting as time goes on to determine whether or not the arthritic process progresses in this case as it did in the old lady and whether or not it finally results in severe difficulty in swallowing. Already there is extreme calcification of the thyroid cartilage.

828 Beacon Street.

CONGENITAL OCCLUSION OF THE CHOANAE, WITH REPORT OF TWO CASES.*

DR. W. T. GARRETSON, Detroit.

This comparatively rare condition was first called to the attention of the profession by Emmert in 1853 in a report in which he presented a case of double congenital occlusion. No other cases were reported in the literature until 1868, when Voltolini reported a case and in 1870 reported another case in which he cites a double and unilateral case, respectively. In 1876 Betts reported a case of double occlusion in a new-born. Solis Cohen[1] in 1880 reported a case of double occlusion in an infant which had suffered violent suffocation. In the same year Ronaldson[2] reported the findings in a series of autopsies on cases of asphyxia neo natorum in which he mentioned congenital occlusion as a frequent cause of death, but neglected to mention the percentage of its frequency. Haag[3] in 1889 in reviewing the literature of all previously reported cases cites 53 verified and 15 unverified cases. Boulay[4] in 1902 in a review of 80 cases and Taxier in 1906 brings the number of verified and unverified to 98, two of which he noted died of asphyxia in the new-born (as quoted by John Edmund MacKenty, of New York[5]). Most of the authors agreed that the percentage in these cases reported gave a little more than a fractional number of cases of actual occurrence. There are many cases which die of asphyxia neo natorum and which are attributed by aspiration of muconium.

Opinions vary as to which bone or bones give origin to the occlusion. Kundrat and Schrotter[6] think that it is the vertical plate of the palate bone, while Luschka[7] believes that the horizontal place of the palate bone is the bone involved. In many cases a great thickening of the posterior end of the vomer has been noted and in one case the origin may have been from the body of the sphenoid. In other cases true sutures have been observed uniting the occluding bone with neighboring parts. In general there are various theories as to the origin of the choanae of the nasal chambers.

First, Ecker and His[8] hold that the buccopharyngeal cavities communicate at first and that the nasal cavity develops later on and is partially shut off from the buccal cavities by the growth inward of the hard and soft palate.

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Second, Hockstetter,[9] Tiemann[10] and Keibel, on the other hand, state that the nasal cavities are from the first separated from the mouth and the pharynx and form a blind *cul-de-sac*. The nasal cavity is formed by the union of the lateral with the mesial nasal process and is made more solid by the proliferation of the mesoderm between the two epithelial layers. The posterior part contains the epithelial layers and as the nasal cavities elongate ultimately reach the nasal membrane, which finally gives away. In this way the primitive choana is formed. In cases of congenital choanal occlusion it is possible that the nasal buccal membrane becomes permeated by mesoderm and therefore fails to break down. Keibel has shown that in badly preserved specimens the epithelial layer which separates the nasal buccal cavity may break off and thus give an entirely erroneous idea of the development in this region. He thinks that Ecker and His must have used such a specimen. There can be little doubt that the opinions of Hockstetter, Tiemann and Keibel supply a more understandable explanation of congenital choana occlusion than those of Ecker and His. Haag and Kahler are of the opinion that the congenital occlusion is due to the persistance of the nasal buccal membrane. Schwendt thinks the proliferation is from horizontal plate of the palate bone, while Schrotter and Kahler regard it as due to outgrowth of the vertical plate. In support of this view is brought forward the fact that the lateral part of the occluding membrane is thicker than the nasal part. Porter[11] and Edeman call attention to the fold sometimes to be found in the nasal opening. He regarded this as a vestigeal structure, which is in reality the remains of what was once the nasal buccal membrane. He, like others, states that a persistance of the whole of the nasal buccal membrane results in congenital occlusion of the choana (as quoted by Fraser[12]).

Type of Occlusion: The occlusion may be unilateral or bilateral, bony or membranous, or partially bony and partially membranous. The thickness varies from a mere membrane up to 12 m.m. Boulay's report,[4] covering 65 cases, found the occlusion bony in 51, membranous and bony in 7, and membranous in 7. Where the two types are combined the central portion of the occluded barrier is usually membrane, while the peripheral portion of the occluded barrier is covered by mucous membrane. The occluded wall is usually situated even with or just anterior to the posterior end of the vomer. In adults unilateral occlusion is far more frequent than bilateral, and bony occlusion is far more common than the other two types. At birth the relative percentage may be different, owing to the frequency of asphyxia and death in cases of double occlusion.

Symptoms: The symptoms in each case necessarily depend on the degree of obstruction present, whether total, partial, single or complete. In double occlusion the symptoms are more marked from the beginning. Often there is a history of marked asphyxia from the time of birth. In these cases unless the mouth is opened wide and the tongue forcibly extended from the hard palate by a tongue depressor breathing is extremely difficult. Nursing is usually impossible and vomiting often ensues. If the child survives the early days spoon feeding must be resorted to. Attacks of suffocation are frequent. After a few months, mouth respiration is usually acquired, but owing to the spoon feeding these patients are very liable to succomb to some pulmonary infection, such as bronchial pneumonia. In general the symptoms and pathology may be classified as follows in bilateral cases:

1. Nasal obstruction of the complete type.

2. Flowing of the tears from the anterior nares owing to the inability to pass into the nasal pharynx.

3. Anosmia. This occurs because of the absence of air currents. This may be relieved and the senses returned after the obstructing barrier has been removed.

4. Accumulation of a destructive type of mucus discharge rarely seen in other affections. It is thick, tenacious, and has a peculiar bluish color. In certain cases it has an offensive odor, especially if it has been retained for any length of time.

5. Atrophy of the turbinates is often present in the later stages. When this is present the nasal chambers appear unduly large.

6. History of difficulty in feeding and nutrition in early life.

Pathological Changes in the Nose: In the unilateral cases the ala nasi is usually immobile. The mucous membrane may be unaltered in the early cases, but after some years it shows pathological changes, such as atrophy or polypoid degeneration, usually well developed and chambers are usually filled with thick, tenacious mucus on this side, sometimes crusts form. Deafness and middle ear suppuration are often a marked feature in both the unilateral and bilateral cases as a result of poor aeriation of the middle ear. In unilateral cases the septum is usually deviated toward the obstructed side.

Differential Diagnosis: Other cases producing nasal obstruction must be differentiated as follows:

1. Adenoids. It has been noted that they also may coexist with the congenital occlusion.

2. Syphilitic rhinitis with atresia.

3. Congenital synechia.

4. Retropharyngeal tumors of all kinds, including myomata, fibromyomata, osteomata.
5. Intranasal tumors of all kinds.
6. Intranasal hypertrophies.
7. High retropharyngeal abscesses.
8. Choanal polypi.
9. Foreign body in the nose.

In syphilitic atresia it is to be noted that bone does not exist and the occlusion is not covered by normal mucosa, but is composed of dense scar tissue.

Treatment: The treatment naturally is surgical and varies in each individual case as to the type of occlusion, whether bony, partially bony, or membranous. If a diagnosis is made in a new-born and if the occlusion is double, operation is to be done at once. In the young an opening made is quite easy to accomplish as the occlusion is often cartilaginous and, if bone, the bone is soft. Four conditions must be considered in every operative procedure:

1. To remove the obstruction without damage to the important structures in the vicinity.

2. Patulous opening must be maintained.

3. Avoidance of important structures. Care must be exercised that the following are not injured by manipulation on the outer wall; pterygopalatine canal, which is situated just anterior to the choanal orifice and is for the transmission of the aforesaid vessels and pharyngeal nerves; and turbinate bones. Posterior palatine canal is situated just behind the choanal opening and is on the outer wall. This transmits some of the branches of the Michel's ganglion and nerves of sensation to the roof of the mouth, nose and some of the motor nerves of the pharyngeal muscles.

Report of Cases: Edna F., age 16 years. Case No. 41859.

History: Patient was first seen at the hospital on April 1, 1924, complaining of discharge from the right ear, nasal obstruction, right, which dated from infancy, and absence of sense of smell on the right side.

Examination: Examination showed deflected septum to the right, much tenacious mucus in the right nostril and complete obstruction on that side. The ears showed mucopurulent discharge, bilateral, with anterior quadrant perforation of both drums. The hearing for the tuning fork tests was upper tone limit, right, 6,000; left, 9,000; lower tone limit, right, 256; and left, 256. The sinuses illuminated well.

Anterior rhinoscopy showed pale mucous membrane on the right, with much tenacious mucus. The septume is deflected to the right. Posterior rhinoscopy showed complete occlusion of the right choana just in front of the posterior edge of the vomer. The mucous membrane is everywhere intact and is smooth; no evidence of scarring.

Diagnosis: In view of the obstruction in the right nostril dating from infancy, with characteristic tenacious mucus and with the complete obstruction to the choana, a diagnosis of congenital choanal atresia was made.

General Examination: The general examination showed infantile uterus and small thyroid. The blood pressure was 88 over 50. Basal metabolic rate was plus 18. Culture from the throat showed staphylococcus auerus.

Treatment: Submucous resection of the nasal septum with the removal of the posterior end of the vomer was advised. This was operated on on May 24, 1924, under local anesthesia. The obstructing wall appeared to be bony and membranous, and considerable of this was removed at the time of the operation by means of biting orceps. This permitted a much wider choanal opening, the posterior end of the vomer having been cut away to the front of the occlusion completely removed the choanal obstruction. Rubber dam packs were placed in both sides of the nose.

Postoperative course was uneventful.

Postoperative Observation: One-and-a-half years following operation the patient was observed by the writer. There was free ventilation on both sides of the nose and no excessive secretion on the right. Mucous membrane looked less pale and more healthy than before operation. The sense of smell had almost completely returned.

Geraldine J., female, age 12 years, American. Case No. 31441.

History: History of complete nasal obstruction on the right which dated from infancy, with absence of sense of smell on this side and constant discharge of thick, tenacious mucus from the right nostril.

Examination: Examination showed that sinuses illuminated well. Anterior rhinoscopy showed deflection of septum to the right, with complete obstruction of the right nostril. There was much tenacious mucus present and the mucous membrane was pale. Posterior rhinoscopy showed complete obstruction of the choana on the right just in front of the posterior end of the vomer; mucous membrane is normal. There was no evidence of scarring. Eardrum showed much scarring and evidence of previous middle ear infection. Tuning fork tests were normal.

General examination showed psychoneurosis, anxiety type. Urine and Wassermann tests were negative. Blood pressure was 102 over 60. General examination otherwise was negative.

Diagnosis: In view of complete nasal obstruction since infancy, with right choanal obstruction, a diagnosis of congenital choanal occlusion was made.

Treatment: Submucous resection of the nasal septum with the removal of the posterior end of the vomer was advised. This was operated on on May 24, 1924, under local anesthesia. The obstructing wall appeared to be bony and membranous, and considerable of this was removed at the time of the operation by means of biting forceps. This permitted a much wider choanal opening, the posterior end of the vomer having been cut away to the front of the occlusion, completely removed the choanal obstruction. Rubber dam packs were placed in both sides of the nose.

Postoperative course was uneventful.

Postoperative Observation: Patient was observed by the writer one year following operation. There was free ventilation on both sides, with no excessive secretion, and the mucous membrane was less pale than before the operation. The sense of smell had returned.

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LOCAL ANESTHESIA IN EXTERNAL OPERATIONS ON THE NASAL ACCESSORY SINUSES.*

DR. ROBIN HARRIS and DR. W. LIKELY SIMPSON, Memphis, Tenn.

The principal object of this paper is to present for your consideration a routine for external operations on the nasal accessory sinuses, principally the frontals, the ethmoids and the sphenoids. This procedure has been developed by gradually weeding out the little details found bad and holding on to and adding such as were thought good. Careful attention to matters which might be, and often are, lightly passed has proven of much value in final results.

The preliminary preparation of the patient for such an undertaking, as radical operations on the frontals, the ethmoid and the sphenoid of one side, under local anesthesia, is most important. As to medication, one of two regular plans are employed. In one hospital where only male patients are handled, ¼ grain of morphin sulphate and 1/200 grain of hyoscin hydrobromid are given in 2 c.c. of 25 per cent magnesium sulphate solution one-and-one-half hours before the time set for the operation, and ⅛ grain of morphin sulphate with 1/200 grain of hyoscin hydrobromid in 2 c.c. of 25 per cent magnesium sulphate solution 15 minutes before the patient leaves for the operating room. At other hospitals the patient is given morphin sulphate grains ⅛ in 2 c.c. of 25 per cent solution magnesium sulphate one-and-one-half hours before the operation. In 20 minutes after the first dose, morphine sulphate grains ⅛ and atropin sulphate grains 1/200 are given in 2 c.c. of 25 per cent solution magnesium sulphate. A third dose is given the same as the first 20 minutes after the second.

With either plan the patient is placed in a darkened room two hours before operation. A tactful nurse is given in charge. No visitors are allowed. The patient is not allowed to talk, and can usually be persuaded to keep the eyes closed. The nurse's job is an important one, but they do not fail you if time is taken beforehand to explain just what is necessary, and why. When the stretcher arrives the patient is lifted on to it and a towel is placed over the eyes. The operating room is ready, no instruments are in sight, but the patient's eyes are kept covered and he or she is gently and quietly lifted onto the operating table. If quiet is had the first 20 or 25

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minutes ordinary conversation by the surgeon and assistant is not noticed by the patient. Occasionally the patient sleeps at intervals during the operation.

The whole face is painted with 5 per cent solution of mercurochrome, sterile towels are placed so that the breathing is free and easy. The inside of the nose is swabbed with a mixture of adrenalin chlorid solution 1:1000, one part, and 4 per cent cocain hydrobromid, two parts, then with 1 per cent mercurochrome solution. Then the side of the nose to be operated on is packed with a strip of gauze wet with the above described cocain-adrenalin solution.

Twenty c.c. of novocain solution is placed in a medicine glass. Twelve drops of fresh adrenalin chlorid solution 1:1000 is added.

Fig. 1. A patient draped ready for injection.
Fig. 2. The two cardinal points of injection.

Care is taken to inject no other than this solution; 15 c.c. is usually injected. Special attention is paid to injection of the lachrymal sac region and supraorbital nerve region. Injection is made all along the line of expected incision, that is along the margin of the orbit and the side of the nose. The incision may be made six or eight minutes after the injection is finished. The bleeding will be surprisingly little, one or two bleeding points usually have to be caught, and occasionally require tieing. For ordinary chronic pansinusitis, the Lynch incision is used. In elevating the periosteum injection of one or two places may be, but usually is not, necessary. The size of the frontals is very well determined by X-ray before the operation. The frontal is opened with gauge and mallet. The opening is enlarged with Citelli rongeur or heavy Hejak punch. Very few patients complain when the frontal

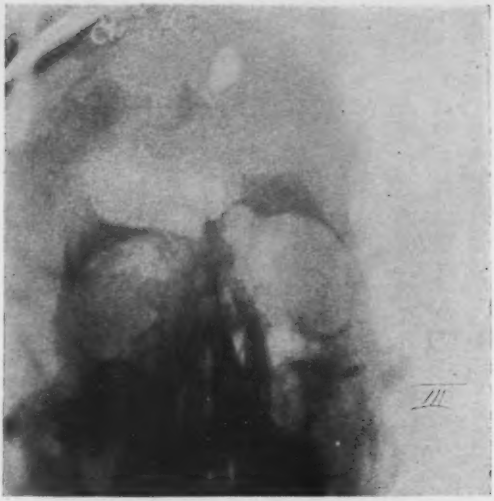

Fig. 3. Skiagram showing frontal lobe abscess.

Fig. 4. The same patient, side view, frontal lobe abscess.

Fig. 5. Chronic pansinusitis of one side. Complete loss of vision from optic nerve atrophy. External operation was too late to save vision.

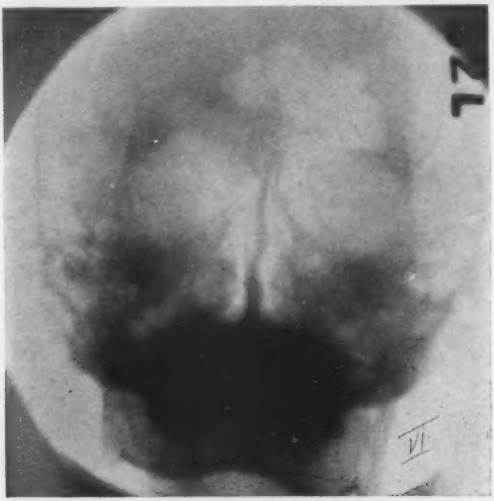

Fig. 6. Skiagram showing chronic bilateral pansinusitis. Had Killian four years previously on the large frontal sinus. External operation right side, small frontal, according to the method of Lynch under local anesthesia. Later the left side had to be reopened because of persistent left-sided headache. The orbital roof was completely taken away at this time and all of the ethmoid cells removed.

sinus is cleaned out with Coakley curette and sharp malleable ring curettes. If any pain *is* felt, packing with cocain-adrenalin solution will stop it. When the ethmoids are opened there will be pain unless packing and working are alternated. Work a bit, then pack and the pain will be *nil*. Then, too, the bleeding is so well controlled that the landmarks and field are always in plain view before the operator at all times. The nasal nerve where it makes its exit from the cranial cavity is accompanied by blood vessels. These are clamped and tied on the orbital side, then cut internal to the clamp. The whole operative field is free of blood when the operation is ended. The time

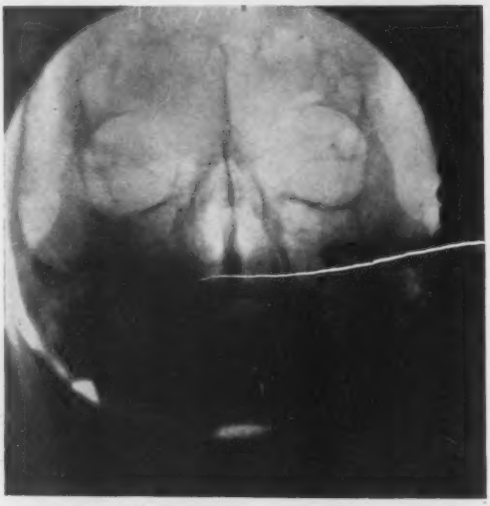

Fig. 7. Skiagram, chronic bilateral pansinusitis. Sinuses very large. External operation both sides, good results.

consumed is less than when general anesthesia is used. No postnasal plug is necessary. Usually the patient does not expectorate during the whole procedure. If desired the contents of the mouth is easily removed by means of suction. The absolute control of bleeding is a joy and a satisfaction. In closing the wound no catgut sutures are used in the subcutaneous tissue. The skin is closed with dermal. Drainage is by iodoform gauze into the nose. Stitch abscesses are rare, especially this has been so since the use of catgut subcutaneously was discontinued. Occasionally it becomes necessary to make an external operation for an acute suppurative process. The anesthesia, however, is usually not so complete as when there is no

swelling. One such case was a rupture of the ethmoid into the orbit, and the pain was severe. The patient was a young woman eight months pregnant. Incision was as above. Under local anesthesia,

Fig. 8. Photograph after bilateral operation as described.

Fig. 9. Photograph after unilateral operation. This was an acute rupture of the ethmoids into the orbit. Drainage tubes were used externally for ten days.

Fig. 10. Photograph six months after external operation for chronic pansinusitis . This patient has gained much weight.

establishing drainage externally and into the nose by means of rubber tubes, relief was had at once. In twenty-four days a full term normal baby was born.

Among other cases may be mentioned an osteoma of the septum between the frontal sinuses. This was a chronic pansinusitis. The sinuess were operated on as above indicated, after the tumor was removed.

Another was a large frontal lobe abscess. The Roentgenologist was so sure the posterior wall of the frontal was ruptured that the frontal was opened. No rupture was found. The posterior bony wall of the sinus was partially removed and the frontal lobe abscess drained through this opening. The patient made an uneventful recovery.

This external method may, perhaps, be a bit more precise, a bit more exact, than the ordinary intranasal methods, but the results are so universally good that general or local anesthesia may be used, according to the particular indications of the case or the preference of the operator; still, forty-eight such operations under general anesthesia, and forty-six under local anesthesia have gradually worked us into local anesthesia as a routine and rarely now do we find it necessary to recommend an operation under general anesthesia.

1201 Columbia Tower Building.

A NEW METHOD OF REMOVING CERUMEN FROM THE EAR.

DR. CARL KAPLAN, Brooklyn.

Inspissated cerumen in the external auditory canal is quite prevalent when surf bathing is in vogue. Newer methods than those previously used are in demand; for curettes and hand syringes too often are painful, tedious procedures to both patient and otolaryngologist.

In attempting to eliminate any pain that the patient may suffer, and to reduce considerably the length of time necessary to cleanse the canals of cerumen, an easy and extremely satisfactory procedure has been utilized.

The apparatus necessary is a Y-shaped English bulb syringe, "Ingraham Aseptible Enema." To its distal end "A" is attached an antrum "B" irrigator suitably curved for its deposition into the external audiotry canal. Trauma is minimized by making the end of the irrigator bulbous.

By immersing one arm of Y-tube "C" into a basin of very warm saturated bicarbonate solution, a continuous stream can be introduced

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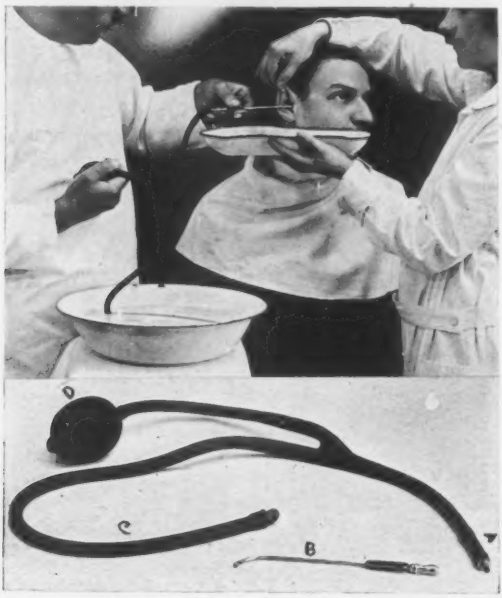
by properly manipulating the ball "D," which is attached to the other arm of the Y-tube as illustrated.

After draping the patient with a rubber apron fitting snugly about neck, he is so seated on a low stool that the light is directed into the auditory canal. In the surgeon's right hand the bulb "D" is placed while the stream is directed with his left holding the antrum irrigator.

The auricle is gently and gradually pulled upwards and backwards with the nurse's right hand while she firmly presses a curved basin against the patient's cheek with her left hand, as illustrated below.



At times dry and firmly adherent cerumen may require a few drops of H_2O_2 or some warm phenol and glycerin for about five minutes. After removing the cerumen, the application of a 95 per cent alcohol solution by an applicator into the canal is very beneficial.

This method is very easily operated and quickly executed: for no more than three minutes are required for each canal.

967 Forest Avenue.

SPONGE PACKS IN OZENA.

Dr. Benjamin Freudenfall and Dr. Simon Stein,
New York City.

The physician has for ages been burdened with numerous theories as to the causes of atrophic rhinitis and its accompanying symptoms. Treatments have been recommended and tried. The unsuccessful results leave the physician with but one impression, namely, the futility of the condition.

The patient, on the other hand, is a great sufferer, isolated from society, has difficulty in holding a position and is disgusting to his own family. Any method which does away with the disagreeable elements of the condition should be welcome, and with this in mind, we are presenting a method of treatment first evolved by Dr. Benjamin Freudenfall at the Midtown Hospital. He tried a great number of methods, medications and preparations until he found that this gave him the best results.

The treatment is as follows: The patient is instructed to place within the vestibule of the nares a piece of red rubber bath sponge. This is the ordinary crude rubber sponge obtained in any drug store. A piece about the size of an almond is used, large enough to just fit within the nares. The spongy appearance of the rubber acts psychologically on the patient, so that the blocking of the nares does not become irksome, as they believe that they can breathe through it. This sponge is left within the nares for an hour in the morning upon arising, and another hour before going to bed. At the end of the time interval, these pieces are removed and the nose sprayed with saline solution to cleanse and free it of any scabs that have collected.

It has been found by Dr. Freudenfall, by myself and those who have used this method, that in those of our patients both in the hospital and in private practice who follow this method of treatment faithfully there is a disappearance of the odor within two or three days to a week. In addition, there is a copious secretion which loosens the scabs, permitting them to be expelled by the patient's own efforts. They feel better, are able to mix socially without the terrible handicap of the odor, and are more agreeable to the physician as patients.

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The action of the "sponge treatment," as we have named it, is due to the following factors, according to our theories:

1. The cutting off of the air for two hours a day.

2. An irritation caused by the chemical impurities contained in the rubber. This last causes the copious secretion and was proven to us by the fact that a rubber which had been purified was used and produced absolutely no results. There can be no mechanical irritation by actual contact, as the rubber is only within the vestibule of the nares.

The treatment as outlined must be persisted in, as any negligence in its use by the patient can quickly be observed by the examiner because of the recurrence of symptoms.

This nasal sponge is sold by The Lasal Products Company, whose advertisement appears in this issue.

CONCLUSIONS.

This method of treatment lends itself to use because of:

1. The ease of application for the patient.

2. The immediate beneficial results.

3. The cheapness of the materials used.

4. The lack of any operative interference, risk and shock to the patient.

There have been a great number of cases under observation within the last seven years with uniformly good results.

24 E. 48th Street.

225 E. 19th Street.

KERATOSIS OF VOCAL CORD FOLLOWED BY MALIGNANCY.*

Dr. David H. Jones, New York City.

I showed this case before this Section about one year ago, and those of us who are associated with Dr. C. J. Imperatori, in the Bronchoscopic Clinic at Manhattan Eye, Ear and Throat Hospital, consider this as one of the most interesting and instructive cases we have come in contact with, as we have seen this patient on an average of every week for the past year and half.

J. R., age 60 years, born in Russia, twenty-five years in United States, pants-maker by occupation. About ten years ago he became hoarse and was treated by a number of physicians, finally being operated upon for some condition in his throat. This cleared up and there was no recurrence until July, 1924, when he noticed a return of his hoarseness, and he came to the Bronchoscopic Clinic, in April, 1925.

Mirror examination showed that his larynx was pale and anemic-looking, and on the upper surface of his right cord at the inner edge, at about the middle third, were minute studded white areas, giving the appearance as if small pieces of wet, white blotting paper were stuck on the cord. No involvement of left cord or arytenoids and no impairment of motion in either cord.

Wassermann and tuberculin tests were negative, as was also the X-ray of chest.

May 11, 1925, biopsy on right cord, direct laryngoscopy showed keratosis of cord, and in Dr. Eggston's remarks he advised that this case be kept under observation as it was very suspicious of early malignancy. On the same day Dr. G. A. Robinson applied 200 mgm. radium pack to right side of neck for two spaces for seven hours, 2800 mgm. hours. Except for a slight reaction following the radium the laryngeal condition continued about the same.

August 7, 1925, second biopsy was done, with about the same report.

August 17, 1925, third biopsy shows marked cornification of the stratified mucosa, with some papillary hyperplasia. The subepithelial tissue shows considerable reaction.

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August 18, 1925, Dr. Robinson applied 230 mgm. radium pack for two spaces, for nine hours, 3400 mgm. hours. Moderate reaction followed.

Sept. 25, 1925, fourth biopsy showed about the same as the third.

Sept. 25, 1925, by direct laryngoscopy 30 mgm. needles inserted into right cord for one and half hours: 45 mgm. hours.

At this time the appearance of the cord showed that the growth was extending anteriorly as well as involving more of the thickness, although the motility was excellent; and in December, 1925, there seemed to be an involvement of left cord at about the same location as on the right.

Jan. 12, 1926, fifth biopsy from right cord showed hyperkeratosis with early epithelialoma degeneration.

Feb. 8, 1926, biopsy from left cord showed early epithelioma.

Patient refused all operative treatment and was sent to Dr. Francis Carter Wood for deep X-ray therapy, and in February he received 10/7 of erythema dose filtered 2 m.m. of copper at 200 KV. In March, 6/8. Aprl, 9/8. May and June, a total of 9/8 . October, 11/5. All of these applications were made directly to the larynx, screening the rest of the neck as much as possible.

At about the fifteenth treatment we noticed that the growth appeared much less, and another thing observed was that there was an extreme degree of hyperemia of the whole interior of the larynx.

Oct. 12, 1926, another biopsy was done on right cord, which showed hyperkeratosis with epithelioma.

Present appearance of right cord shows considerable involvement, especially at anterior end; growth has etxended below cord and is more subglottic and cord is bowed; does not meet the left cord. The involvement of the left cord is very much less than on right and only on upper surface. The motility of both cords and arytenoids is not much impaired.

114 East 54th Street.

ULCERATION AND STENOSIS OF THE LARYNX IN TYPHOID FEVER.*

DR. JOHN R. DAVIES, JR., Philadelphia.

Inflammation of the larynx in the course of typhoid fever has been observed and commented on since the middle of the last century. Barthez[1] in Paris was one of the first to call attention to the condition, reporting his "Observations of Necrosis of the Larynx in Typhoid Fever" in 1860. Gruder in Berlin in 1888, and Antonoff in St. Petersburg in 1889 also emphasized it.

The type of the inflammation varies from the simple catarrhal form to complete necrosis of the arytenoid cartilages. McCrae[2] reports one case where the necrosis was so extensive that the patient coughed up both arytenoid cartilages. Souques[3] also reports a case of complete necrosis.

Most of the writers upon this subject look upon this condition as rather infrequent. Fussel[4] states that in 2,000 cases of typhoid fever in Munich in 1891, only 15 showed any laryngeal involvement, and he reports only one case of ulceration of the larynx in typhoid fever from his service in St. Timothy's Hospital. Stolterforth[5] reports a series of 203 autopsies on typhoid fever cases, only one showing laryngeal complications. Schrotter[6] in the Rudolph Hospital in Vienna examined the larynx of every patient with typhoid (total number of cases not given) and found it occurred in 3 per cent of the cases. In St. Bartholomew's Hospital seven cases were found in 53 autopsies.[7] Lemke says it is one of the rarest complications of typhoid fever.[8] In the autopsy records of the Ayer Clinical Laboratory of the Pennsylvania Hospital there have been 221 necropsies performed on patients dying of typhoid fever. Only two cases have shown laryngeal ulceration. One was in the records of Dr. Warfield Longscope in 1904, the other is the case reported in this article. One case of laryngeal ulceration was operated on by Dr. Packard in the Pennsylvania Hospital in 1916 with recovery. In the operative records of the Pennsylvania Hospital over a period of twenty years, only two cases of typhoid ulceration had tracheotomy performed.

McCrea reports only three cases of ulceration of the larynx in a series of 1,500 clinical cases and 105 autopsies on typhoid patients in

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Johns Hopkins Hospital.[9] George Laurens in his recent textbook considers that ulceration is fairly frequent, but gives no statistics.[10] Jackson reports in a series of 360 typhoid cases studied in the West Penn Hospital in Pittsburgh in 1905, 68 cases showing ulceration of the larynx.[11] The age incidence is that of typhoid fever itself, the youngest case reported occured in an infant age 1 year, and the oldest in a man age 55 years. It is more frequent with males than in the female. Ulceration of the larynx in typhoid fever usually occurs after the third week, and when the infection is of the more severe type.

The older idea as to the cause of the ulceration was, that due to the musculature in the neck atrophying in the course of the prolonged fever, the larynx was without support and rested on the spinal column. Thus by pressure an ulcer developed, in much the same manner as a bed sore does. No doubt the dry, furred tongue and pharynx are predisposing factors in the formation of an ulcer. In the larynx are lymphoid follicles analogous to Peyer's patches and the ulceration is probably produced by "erosin of the mucose, rendered vulnerable by the toxins of the disease." In some cases the bacillus of Eberth has been demonstrated in these ulcers by Eichhorst.[13] Jackson states that ulceration of the larynx in typhoid fever is almost always due to a mixed infection.[14] It would seem that the finding of the typhoid bacillus in the larynx would indicate that the mixed infection was secondary, not primary.

Pain in the larynx, hoarseness, and discomfort in swallowing are the usual symptoms. There may be cough, expectoration of blood and dyspnea.

The case I wish to report is that of a colored man, age 24 years, who was admitted to the Pennsylvania Hospital on Dr. McCrae's service on March 11, 1925.

He was apparently at the end of the second week of typhoid fever when admitted. His urine showed a trace of albumin, blood culture positive, paratyphoid B positive, and a positive Wassermann. For the first week the course of the disease was uneventful. In the latter part of the third week he had sudden abdominal pain, profuse perspiration, and a drop of temperature of three degrees in less than three hours. The diagnosis of a perforated typhoid ulcer of the intestine was made, and he was operated upon by Dr. Gibbon and the perforation in his ilium sutured.

Three weeks after his admission he compained of pain in his throat and was slightly hoarse. His pharynx was somewhat congested, but due to his toxic condition laryngeal examination was not satisfactory.

His laryngeal condition remained quiescent until the end of the sixth week of the disease, when he coughed considerably and expectorated about an ounce of bright blood. Examination by Dr. Packard at this time revealed an acute inflammatory process of the larynx.

His laryngeal symptoms again subsided until the ninth week of the typhoid, when he suddenly developed marked inspiratory dyspnea. The following morning his dyspnea had increased, and the writer performed a low tracheotomy upon the patient. At first he secured instant relief when the ordinary tracheotomy tube was inserted, but unfortunately the relief was of short duration and his respiratory distress increased. A cane-shaped Jackson tube was substituted. This also failed to relieve his dyspnea, and the patient died a respiratory death some twenty-seven hours after tracheotomy had been performed.

Autopsy Report: The following notes by Dr. John R. Paul, Director of the Ayer Clinical Laboratory of the Pennsylvania Hospital, are of very great interest, parts of which I quote:

"On opening the chest cavity both lungs are markedly collapsed and atelectatic. They lie at the posterior aspect of the chest, occupying about one-fifth of the thoracic cavity. At the bases a few lobules are moderately air-containing. On dissecting the bronchi they are found to be filled with a turbid mucoid material, which extends to the bifurcation of the trachea.

The epiglottis, larynx, trachea and lungs are removed in toto. On exposing the larynx considerable thickening of the vocal cords is found. They appear to be four or five times their normal size and are densely opaque. They approximate each other so that the lumen is completely obliterated, and on opening, one surface of the cords is completely flattened, caused by their contiguity. On the left side there is a small cicatrix causing a depressed stellate scar, which has completely obliterated the normal structure of the vocal cord. The trachea below the larynx shows a moderately acute catarrhal inflammation. Around the tracheotomy wound is a moderate degree of infection with a dissecting abscess formation extending 2 to 3 c.m. around the trachea."

Pathological Discussion (Dr. Paul): "The laryngeal lesion is not absolutely established as being typhoid in origin, but the evidence points strongly in its favor. The difficulty in getting the tracheotomy tube to work may be explained by the extreme pulmonary atelectasis and plugging of the bronchi with mucus."

In the case reported here one very important point, in view of the post-mortem findings, presents itself. Jackson, Lee and Tucker[15]

have shown that massive collapse of the lungs can be caused by the formation of mucus plugs in the bronchi. Tucker has reported one case of massive collapse following appendectomy, due to the formation of mucus plugs in the bronchi, and when the mucus was removed by means of the bronchoscope the patient recovered. Undoubtedly the case reported here died as a result of massive collapse of the lungs. Whether the use of the bronchoscope would have prevented th fatal termination I cannot say, but as a result of the autopsy records it might have possibly done so. In conclusion several points in the laryngeal complications of typhoid fever are worthy of consideration. Although the clinical and post-mortem records show ulceration to be a rather rare complication, it undoubtedly is more frequent than the records show. In the milder forms at least, it may be overlooked, due to the toxic state of the patient, and because of the difficulty attending a satisfactory examination of the larynx in a well lighted medical ward. The condition is much more frequent in the severe cases and the proper care of the mouth, tongue and pharynx in these cases is an important point in its prevention.

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302 S. 19th Street.
8617 Germantown Avenue.

THE NEWER TESTS FOR HEARING, WITH DEMONSTRATION OF METHODS.*

DR. EDMUND PRINCE FOWLER, New York City.

There appears to be some confusion regarding the execution and the meaning of the new tests for hearing; mainly, I believe, because in describing them unfamiliar technical terms have been employed. I shall therefore endeavor to avoid all technical language in the discussion to follow.

Any audible sound may be used to measure the ability of the human ear to hear it, and many sounds are so complex (embrace a sufficient number of frequencies) that we may use them as a rough average gauge of hearing. Two methods of application have heretofore had to suffice in employing sounds for hearing measurements. First, the distance from the ear a given sound is audible. Second, the length of time in seconds a body vibrating with a definite initial intensity and rate of loss in intensity, is heard. These are used in connection with previously determined distances or times that the average normal ear hears them. And so we may gauge the hearing if we have a voice, an acumeter, a monochord, a Galton whistle, tuning forks or a watch, and the time and space and quiet to properly employ them.

There is nothing intrinsically wrong with any of the older standard tests. It is in the method of employment, in the lack of appreciation of their possibilities and limitations, in their careless use and interpretation, in the excessive time required, in lack of space, in the need of a quiet place, and in the variation between instruments, wherein lie their chief deficiencies. The monochord, though ideal in frequency range, gives but a hazy idea as to the volume of sound produced. The tuning fork, properly made and standardized, is a scientific instrument. The way it is usually used, it becomes a snare and a delusion, because few of us determine accurately its rate of decrement (the speed with which it dies down) or the given definite amount of energy required to set up in it a given definite duration of vibration. Even if we do this we cannot compare its findings with those of other forks because of the many variables between instruments and their methods of employment. Moreover, to arrive

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at accurate measurements several tests at each frequency must be made, and this is time consuming. But I believe, with care, it can be used with accuracy and with dispatch.

The Galton whistle emits several frequencies besides its fundamental tone, and we do not know certainly which of these the patient hears. Moreover, we do not know how loud it is sounding. It does not emit its various tones with equal intensity and there is great variation between instruments. Because someone does not hear the Galton whistle or some other instrument, or any given tone, it does not mean he cannot hear it. It means simply that we are not sounding it loud enough for him to hear it.

Ten octaves (from about 20 d. v. to 20,000 d. v.) constitute the normal human range of hearing. Four octaves (from about 256 to 4096) cover the frequencies most used for the hearing of speech. It is evident that sounds covering at least the latter must be employed if we are to approach an estimation of the hearing for speech, and that about seven must be used if we are to determine the real state of the hearing apparatus.

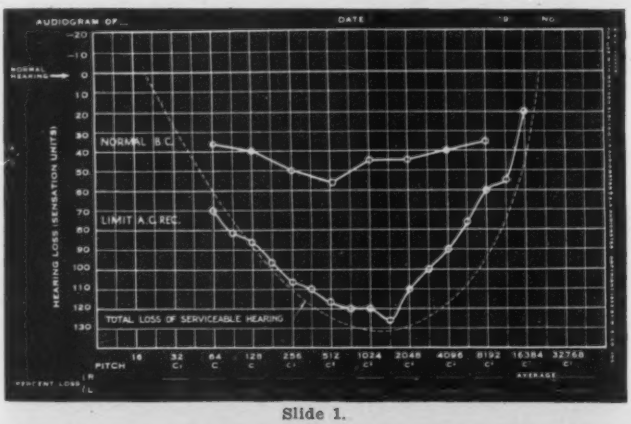
Tactile sensations follow the law of "Weber-Fechner." This maintains that all stimuli must be changed (increased or diminished) a certain percentage of their intensity to enable any change in intensity to be noticeable to the subject. Hearing is but a specialized tactile sense and human hearing follows very closely the "Weber-Fechner law." For instance, ordinary speech appears to be just perceptibly louder if it is increased 10 per cent in intensity, and perceptibly fainter if it is decreased 10 per cent in intensity. Other things being equal, it will not appear to change at all in intensity unless it change at least 10 per cent up or down.

The human ear also senses the octave of any note with great accuracy. The octave is always exactly double the number of vibrations of the note sensed as one octave below it, or one-half the number of vibrations of the octave above it. Hence it is apparent that the human ear is so built that it, like the other tactile senses, works logarithmically both in its ability to sense changes (that is, intervals) between frequencies, and in its ability to sense changes (that is, intervals) between intensities. In both cases the equal fractional increases, sound like equal changes in loudness or in pitch, whether you are dealing with either high or low values of intensity or frequency.

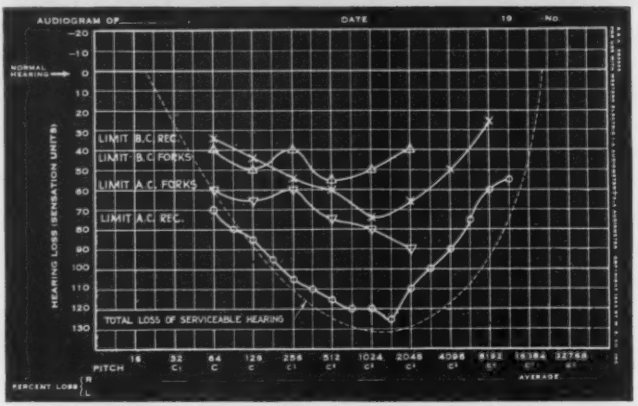
Using these characteristics as a basis for plotting the curves of hearing, we have constructed a chart which we call the audiogram. The vertical lines (ordinates) represent different frequencies (equal-

ly spaced, *i.e.*, each represents twice the one before it) and range from 32 SU to 16,000 SU (nine octaves of the musical scale).

The longitudinal lines (abscissa) represent intensities and range from zero to 130. (These are also equally spaced, *i.e.*, each line represents ten times the intensity of the one above it.)



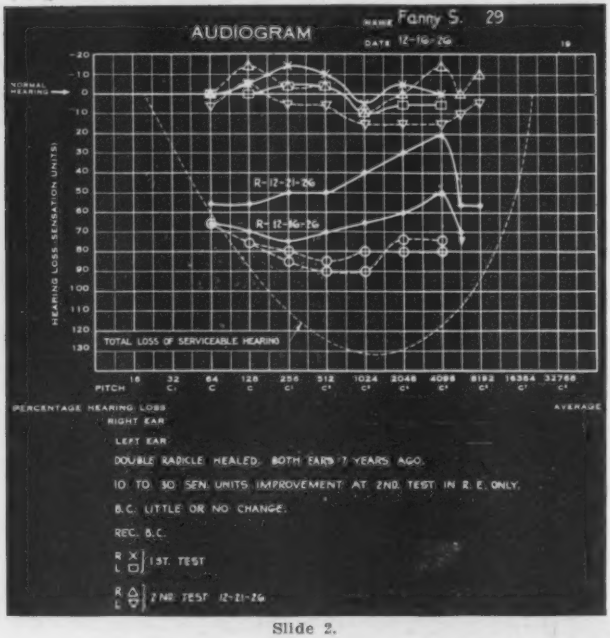
Slide 1.



Slide 1a.

By the use of new and accurate electrical and acoustical apparatus, it has been determined that the amount of sound intensity necessary for faintest audibility could be definitely fixed in units of physical measure (dynes and ergs), but that no measurement for any single frequency at minimum audibility was identical with the measurement

at minimum audibility for any other frequency. Therefore, if we are to construct a logical, usable chart of measurements of hearing capacity, we must start at minimum audibility with each frequency, and measure from this intensity as a base. Fortunately, as shown above, this is easily done because at every frequency the ear senses change in intensity logarithmically; therefore, it is immaterial what intensity is required for minimum audibility at the different frequencies so long as we determine accurately the exact intensity of the

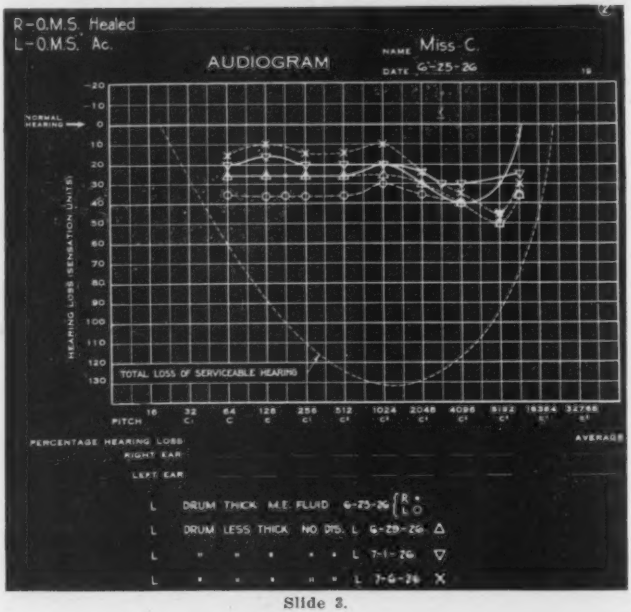


Slide 2.

sound required for each. This has been carefully done, and the average normal minimum amount of sound force required for hearing the various frequencies determined and plotted in a curve. (This is the curve of normal hearing.) Likewise plotted is the maximum amount of sound intensity that can be heard without confusing it with feeling. If any sound is louder than this it will go beyond simple feeling and will cause pain. Slide No. 1 shows these two curves. The lower is the curve of minimum audibility, the upper the curve of feeling threshold, or maximum audibility. Between these two lie the hearing limits of the average human ear.

You will note at the right and left where the hearing and feeling curves cross that the intensity is so great that it is felt at the same height that it is heard. The crossings or ends of the curves, therefore, represent practical limits of audition; the lower about 20 d. v., and the upper about 20,000 d. v. The curve of minimum audibility shows at each frequency the amount of energy and of intensity (force and power) of sound vibration necessary to be just heard.

For simplification and ease of reading we maintained that a straight line would be preferable to a curve, and so the audiogram charts are



Slide 3.

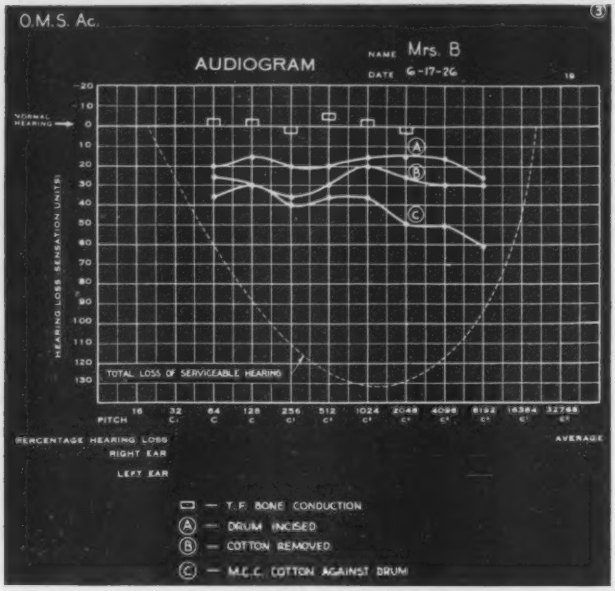
now made with the curve translated in a straight base line. This base line represents the average normal hearing capacity of 82 apparently normal ears.

If an ear requires ten times the normal minimum intensity of sound before it hears the sound, it is said to be ten units down in hearing, each unit representing the minimum amount of change in intensity that the normal ear can sense.

Ten units therefore represent 10 times such a change. Twenty units therefore represent 100 times such a change. Thirty units

therefore represent 1,000 times such a change. Forty units therefore represent 10,000 times such a change. Fifty units therefore represent 100,000 times such a change. Sixty units therefore represent 1,000,000 times such a change. Ninety units therefore represent 1,000,000,000 times such a change. One hundred and twenty units therefore represent 1,000,000,000,000 times such a change.

It is a physiological fact that the degree of loudness produced by a change from 0 to 10 SU is the same as when the change is from 10 to 20, or 20 to 30, etc. We call these units of change in intensity "sensation units." I use as a brief contraction of "sensation unit"

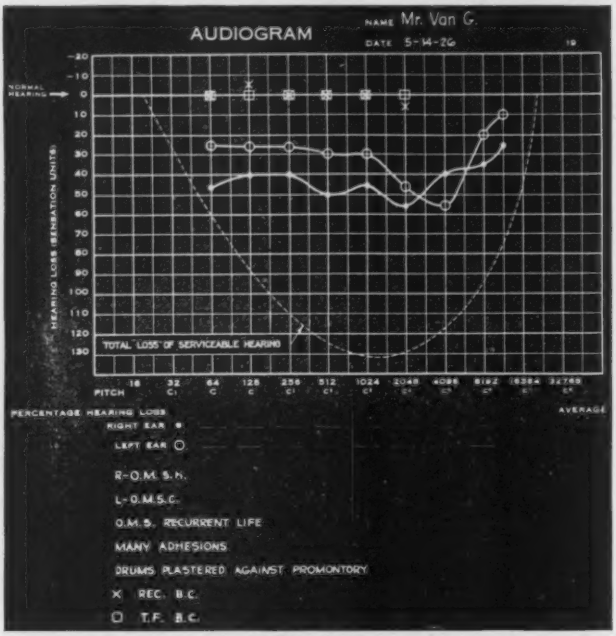


Slide 4.

the designations "Sen" (or "Su"). It appears easier to say "sen" or "su" than the longer designation, "sensation unit." We are open to suggestion as to which term is preferable, if either.

The old tests of hearing used no common unit of measure. The new tests of hearing, which I shall demonstrate, use the "Sen" (sensation unit) as their unit of measure. Any sound-producing instrument may be calibrated so that we may use with it the "Sen" or SU as a unit of measure. This is a great advance in audiometric measurements because we may now talk the same language, and when an

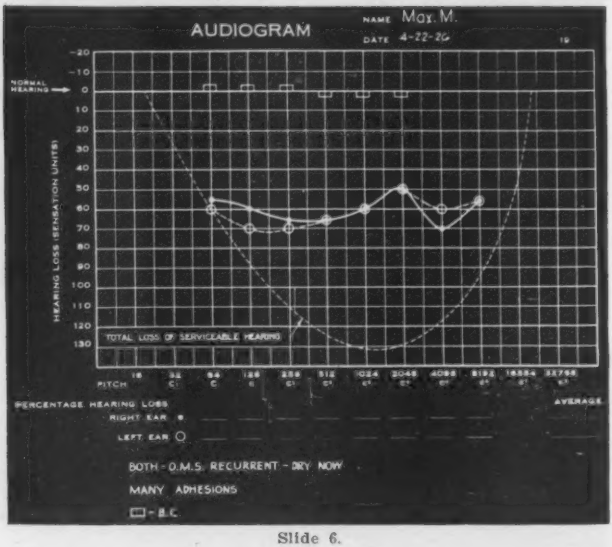
otologist says that a certain ear has a hearing loss of ten, twenty, thirty or more Sen (SU) at one or more frequencies, other otologists will know exactly what he means. When we spoke formerly of the number of seconds loss in hearing, none except the examiner, who knew the fork's calibration, could come anywhere near understanding what was actually meant, because different tuning forks vary greatly, some forks as much as 60-70 seconds from others in the time of their audible vibration even with a standard blow of excitation.



Slide 5.

The Western Electric audiometers are all calibrated to read in "sensation units" (Sen). They measure the intensity of sound electrically. There are no vibrating joints or gauges to get out of order. The only moving parts are a pointer to set at the frequency desired and a dial rotating clockwise and counter clockwise to indicate the intensity of the sound used. With these instruments, it requires but a few minutes to make an accurate estimate of the hearing for the frequencies of which the different machines are capable. Elsewhere full descriptions of these instruments may be found. The Western

Electric Company has kindly supplied the instruments and personnel to give us tonight a demonstration of the 2A, 3A and 4A audiometers. The first is made with tones from 64 to 8,000 SU. The 3A is a simpler machine for testing the hearing with a scale of noise graduated in sensation units. Aside from being useful as a quick test for the general hearing capacity it is also useful mainly as a noise apparatus for masking one ear, and in schools for the deaf for rapid determination of the best methods of teaching the pupils (demonstrate). The 4A is a phonograph audiometer which reproduces speech electrically nad distributes it at identically measured intensi-



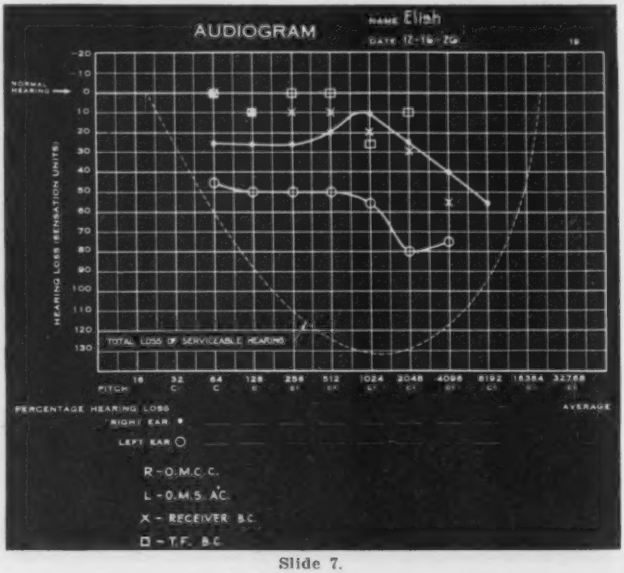
Slide 6.

ties to any number of receivers up to 40. The slides show the instrument and the manner of using it in a schoolroom.

After exhaustive tests we were compelled to abandon the natural spoken voice for group testing because of many unsatisfactory results, but the 4A audiometer has been used for several thousand children with accurate results and a great saving of time.

The listener with the telephone receiver over the ear hears numbers spoken by both a woman and a man. These spoken numbers decrease in loudness in regular steps (3 SU) from a point louder than one with normal hearing could easily hear them to a point at which only one with the best of hearing could interpret the numbers.

Up to 40 may be simultaneously tested with each set. Prepared sheets are given to each listener, as shown in slide and a master sheet is used for correcting the results of the test. One school of 1,000 pupils was tested with the 4A audiometer in two and one-half days. A defect of 9 SU was taken to denote defective hearing; 7.3 per cent were found defective in one or both ears. After a check-up with the 2A audiometer and a careful otological examination, we were convinced that the phonograph audiometer was accurate and essential for group testing (demonstrate the 4A audiometer).



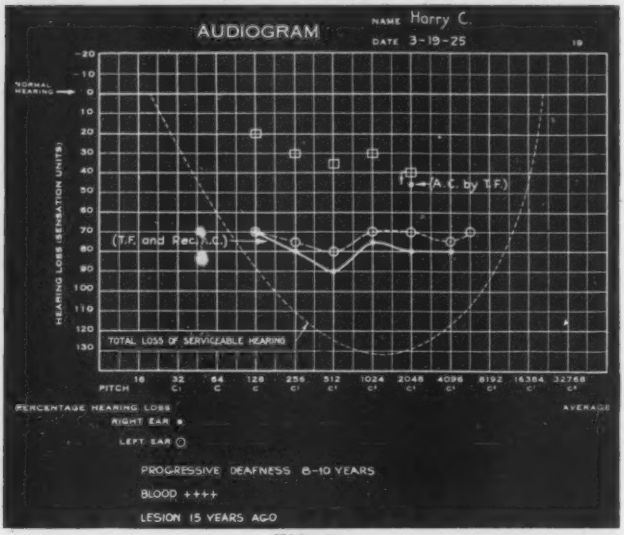
Slide 7.

The medium and loud whisper, also the medium and loud voice, have been carefully measured by Dr. Harvey Fletcher (New Methods and Apparatus for Testing the Acuity of Hearing. THE LARYNGOSCOPE, Vol. XXXV, No. 7, July, 1925). With a large, quiet place free from reflections, the acuity of hearing for the voice may be approximately measured in sensation units (SU). It is apparent that the old practice of noting the result of voice tests in the results of tuning fork tests as portions of normal time they are portions of the normal distance is logical, but not so is that of giving heard. Likewise the watch tick, acumeter and coin click tests have been reduced to SU; but there are so many difficulties attending

their correct employment that for practical purposes they are not available except very occasionally.

The 2A and its more elaborate brother, the 1A, audiometers are now so extensively used that I shall not take the time to further describe them here. However, a few audiograms may be illuminating. Eight we show in Plate A and eight in Plate B (all of children). Beneath each audiogram appears the diagnosis of the lesion in both ears.

In the first group it appears that except where one ear is near normal, or totally deaf, there is often not much difference in the general



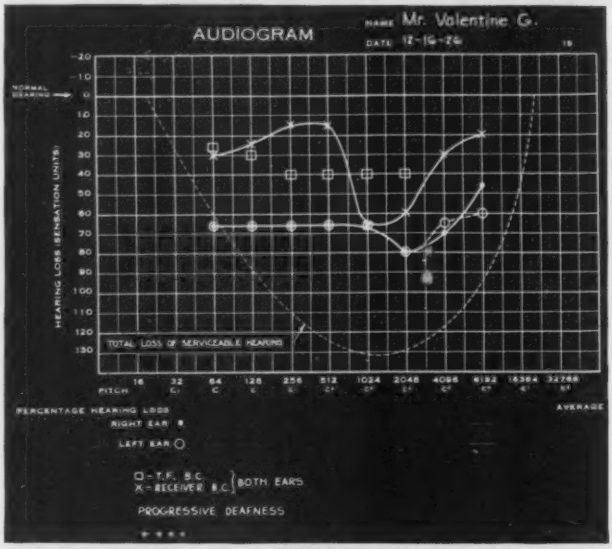
Slide 8.

trend of the curves of a pair of ears. This is a very common finding, but not constant by any means, especially in adults. The curve of hearing of a totally deaf ear may seem an anomaly. It really represents the hearing of the good ear as determined with the receiver over the dead ear, the sound reaching the hearing ear through the air, the skull, and the head piece which holds the receiver against the ear. About 50 to 60 SU represents the amount required for minimum audibility through the totally deaf ear to the better ear.

You will note that although the higher tones are markedly down in many of the curves, only one diagnosis of nerve deafness was made.

and this not because of the depression of the higher notes, but because of the history and other careful otological examination.

From the audiograms alone we could not make a diagnosis of nerve deafness except in certain extreme cases. No more can you make such a diagnosis with tuning forks by air conduction. Fortunately in both cases bone conduction aids us, and a receiver attachment for the audiometer has just been perfected which appears to be quite reliable. I present it for your inspection, and will show some audiograms made with it and their relation to the air conduction curves.

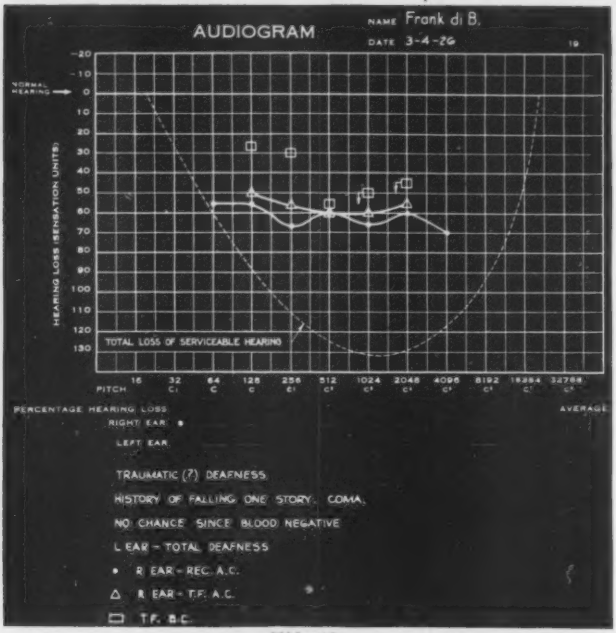


Slide 9.

The receiver would, I believe, function better if the button was slightly convex. The B. C. is measured from the line which gives the dial settings for the normal B. C. base line for the receiver used.

Now, I have not deserted the tuning fork. In all my work I check up the audiometer findings with tuning fork tests from 64 d. v. to 2048 d. v. for both A. C. and B. C. My forks are calibrated so that I may by their use make just as good audiograms as by the audiometer, and until the advent of the audiometer my method of testing was the only one which measured in Sen (SU) the hearing of both A. C. and B. C. Briefly, the methods is as follows:

Place the patient in a chair with the head steadied against the back rest; if necessary arrange the hair above the auricles so as to leave the mastoid region unobstructed. Hold the tuning fork in the right hand, strike it your standard blow upon a hockey puck or on the knee above the patella. A blow of considerable force will be found to be most satisfactory because an over-excitation of the fork will be compensated for automatically. Place the side of the extremity of one prong opposite the auricle until the patient states "yess" if he



Slide 10.

hears it, and "no" if he does not, then immediately place the shank of the fork perpendicularly and firmly about three-quarters of an inch behind the roof of the meatus. Immediately upon the patient's signalling "yes" or "no" again place the prong before the meatus. Alternate these placements before the meatus and on the mastoid every 3 seconds, continuing the alternations until the patient ceases to hear any sound by both air conduction and bone conduction.

By this method of procedure we are enabled to produce approximately the same ratio of loss in the sound of the fork, both by air

conduction and by bone conduction. In no other way can this be done. If the fork is calibrated so that we know how many seconds loss equal a sensation unit loss, we can easily determine the exact amount of hearing loss for both air conduction and bone conduction in the same units of measure and can construct an audiogram of the hearing as accurately as by a 2A audiometer, if we employ enough care and a sufficient number of tests at each frequency to eliminate error.

The alternate method of placement is conducive to accurate measurements because it diminishes tires and better determines the point of minimum audibility. To save time, if an examiner's bone and air conduction are average normal, he may instead of measuring the total time the fork is heard by air and bone conduction, simply compare the time his own ear hears these in lack or in excess of the time the diseased ear hears them. To do this, however, it is very essential that the test be made in a soundproof room or a very quiet location, because the patient otherwise will appear to have better air conduction and better bone conduction than is really the case, because the sounds the examiner hears are masked by extraneous noises.

For research the audiometer has two distinct advantages over tuning forks, namely its greater range of frequencies and its greater range of intensities. The latter over twice that of the best forks.

Show lantern slides as follows and briefly discuss (the legend on each slide tells the story):

1. Intensity limits of T. F. by A. C. and by B. C.

1a. Limits of audiometer A. C. and B. C. receivers.

2. Fanny S. A. C. greatly depressed. B. C. near normal at all frequencies; 10 to 30 "Sen" improvement in A. C. between two tests, etc.

3. Miss C. Effect upon the hearing of healing, after O. M. C. Ac.

4. Mrs. Bald. Improvement in hearing following removal of wet cotton and incising drum, etc.

5. Mr. Von G. A. C. markedly down, B. C. by T. F. and receiver normal at all frequencies.

6. Max Marku. A. C. more markedly down, B. C. normal.

7. Elish. T. F. and receiver B. C. differ at high frequency.

8. Henry C. Specific nerve deafness ? A. C. and B. C. markedly down. How do we know it is specific deafness?

9. Valentine G. Specific deafness ? B. C. differing between T. F. and receiver at mid and higher frequencies.

10. Frank Di B. Traumatic deafness.

Time forbids intimate discussion of the audiograms just shown, but it is apparent that with such tracings of the hearing capacity made either with the audiometer or with calibrated tuning forks we are supplied with a definite chart of the hearing, measured in units universally understandable, and comparable with results obtained by others.

I have utilized my time in describing the new tests of hearing with which I am most familiar, and in whose development I have been closely associated. There are few modifications of the older tests which it seems inadvisable, at this time, to go into, as they have not been extensively adopted by the profession. It must be clearly understood that we are not claiming that the new tests for hearing are imperative for the purpose of making a diagnosis, in the great majority of cases. We do claim that with their continued use we are going to discover that our prior methods have been somewhat faulty and that, with the help of the new methods, we are going to get a better insight as to how the ear mechanism functions in health and in disease.

114 East 54th Street.

A NEW INSTRUMENT FOR PLACING SUTURES IN THE TONSIL FOSSA, FOLLOWING TONSILLECTOMY.*

DR. WALTER A. WELLS, Washington, D. C.

The fear of hemorrhage is without doubt the outstanding consideration of patients who require the operation of tonsillectomy, and it is generally recognized by surgeons as the most frequent serious complication. There are now and then instances reported of a fatal termination.

By those most experienced there is little value attached to astringents, styptics, vasoconstrictors or coagulating agents, as such means are only effective in oozing and quiet bleeding, which if nothing were done would cease spontaneously in a short time.

When bleeding persists some operators adopt the unsurgical procedure of sewing the pillars; some still employ the cumbersome special hemostats, which are extremely painful to the patient and tend to produce sloughing of the tissues.

Most surgeons, however, in the event of failure to check hemorrhage by prolonged pressure or the use of the hemostatic forceps, rely upon ligature of the vessels in the wound, done either by throwing the thread over the end of the forceps, or by passing a needle through the tissue, which when tied will embrace the bleeding vessel. In rare instances it has seemed necessary to tie the carotid, but it is probable that in most cases, this formidable procedure might have been avoided by a timely application of a ligature in the wound surface.

In the average case the ligating of vessels in the tonsil fossa is a simple matter for the experienced throat surgeon, but cases are met with in which the technical difficulties are greatly increased by reason of the conformation of the mouth cavity and the inaccessibility of the bleeding area. In a deep cavity one may experience considerable difficulty in slipping the ligature over the end of the forceps preliminary to tying, or in so passing it through the tissue that the point will emerge at the proper place to be seized and not become engaged in the underlying pillars. Furthermore, there occasionally occurs a much dreaded accident, in that the needle which must be curved may

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break under the grasp of the needle holder or forceps as it is being forced through the tissue.

It appears, therefore, that in some instances the operator neglects the only procedure that would insure a bloodless recovery, and as a consequence the patient may have to be subjected to disagreeable, painful postoperative procedures, and sometimes a secondary anesthetic.

For these reasons it would seem highly desirable to have at hand some method of applying a ligature with greater precision and facility and also with greater speed, which is a particularly important consideration in such cases.

The instrument we have designed for placing suture ligatures in the tonsil fossa is constructed on the general plan of the hemostatic

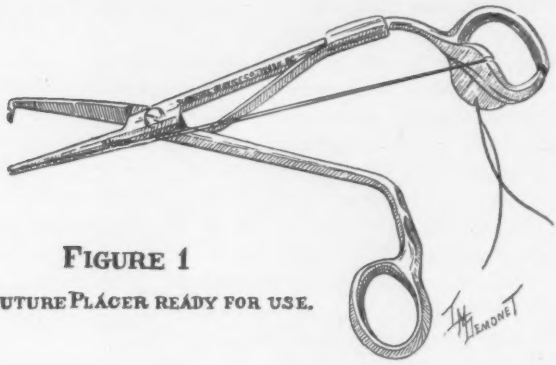

FIGURE 1

SUTURE PLACER READY FOR USE.

forcep, slightly curved at the handle. At the distal end of one blade and at right angles to its inner surface there is fixed a short, curved needle, with its convexity outward and having near its center an eye which opens by a fine slit on the convex border. The eye should be extended a little toward the point of the needle.

On the opposite blade there is a notch to receive the needle, and another notch at right angles to this for the reception of the thread. The latter must be made at just the right depth, so that as the instrumen closes the thread will ride over the convex surface and, being thus under tension, must fall into the opening and become engaged in the eye of the needle.

If the instrument be properly constructed and properly used, it will be possible to place a suture in any portion of the tonsil fossa without difficulty and in a moment's time.

The needle having pierced the tissue with the closure of the jaws, on their again opening a double thread is caught and drawn through. It should be well held in the extended eye, until brought outward through the mouth.

Simultaneously the thread is released from the end of the other blade and this is the distinguishing feature of the instrument, and very essential, for it obviates undue tension upon the tissue and the danger of cutting through.

There are two methods of using the instrument. In the usual method the thread is placed through the ring in the handle, an opening being made for that purpose.

That part of the ring over which the thread glides is widened to increase the surface of contact with the thumb.

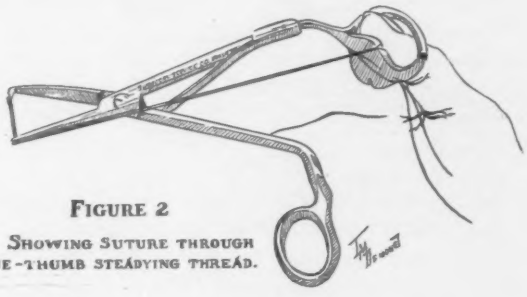

FIGURE 2

SHOWING SUTURE THROUGH TISSUE—THUMB STEADYING THREAD.

At the lower edge there is a notch narrowed to form a wedge into which the thread may be drawn and tightly held until the instrument is brought into action (Fig. 1).

A slight tug will then easily disengage it and it can be held sufficiently taut by the palmar surface of the thumb (Fig. 2).

In the other method of using the instrument the thread is simply held taut by looping it around the index or one of the other fingers of the grasping hand (Fig. 3). The act of closing the blades lessens the distance between tip of the instrument and the hand and thus serves to increase the tensing of the thread.

The surgeon may select one or the other way according to his individual preference or special aptitude; the former method having the advantage that the instrument can be previously prepared by nurse or assistant and thus be ready for immediate use.

We advise catgut for suture material, preferably single "O," previously wet to make it sufficiently pliable, and long enough to reach well beyond the handle. It is quite feasible in many cases, with this instrument, to place the suture directly into the tissue, without using the hemostatic forceps, but it is advisable in most instances to first pinch up the tissue in the usual manner with the forceps and then insert the needle. The thread being carried through doubled, we may tie both threads as one; or, if desired, we may cut the loop and tie two threads in opposite directions, thus covering a greater area of tissue and increasing the assurance of embracing the bleeding vessel.

The urgent need beng recognized for some means of more easily placing a ligature in the tonsil fossa, a number of instruments have

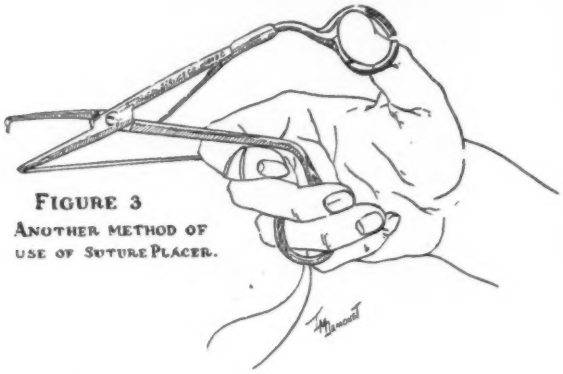

FIGURE 3
ANOTHER METHOD OF USE OF SUTURE PLACER.

been designed for that purpose, though none that I know of has proved sufficiently practical to come into general use.

Most of the efforts have been directed to devising a means that would facilitate the slipping of the knot over the point of the seizing forceps.

An ingenious instrument originally designed to place a suture through the epiglottis has been modified for use in the tonsil operation. It operates by transferring the needle *in toto* from one blade of forceps to the other. It is, however, too complex for general use. Demonstrating my suture placer at the last meeting of the Eastern Section of the American Laryngological, Rhinological and Otological Society, my attention was called to a similar instrument designed by Cavanaugh, of Chicago. I had not seen this instrument, but later obtained one.

The similarity I found to be on the appearance only, as they differ essentially in the manner of operation.

In the Cavanaugh instrument the thread is drawn through a perforation in the end of one blade and as this requires that a greater traction be exerted, we find the needle is made with the opening on the inner border. The result is an undue tension is exerted upon the thread, which makes it liable to cut through the tissues.

Furthermore, this kind of construction demands that the needle be made straight, instead of having the preferred curved form.

We observe further that the thread is supposed to be held in a spring on the handle, from which it needs to be loosened before the instrument can operate.

These defects are entirely avoided in my instrument, which has been in use now by myself, my associate and some of my colleagues for several months.

As the needle has the proper curve, it can often be passed through the tissue directly without first pinching them up with the forceps, and the internes at the Episcopal Throat Hospital inform me that they have often used it this way for stopping hemorrhage following operation, when otherwise a general anesthetic would have been required.

The operation of placing sutures by this method can be done so easily and with such little loss of time that ties should always be placed at every suspicious point, and if done as a routine procedure it would, we believe, eliminate or materially lessen the incidence of secondary bleeding.

This instrument is manufactured by The Surgical Service Company, Washington, D. C.

The Rochambeau.

A CASE OF LUNG ABSCESS FOLLOWING TONSILLCETOMY.*

Dr. J. D. Whitham, New York City.

R. K., a girl, age 16 years, on Sept. 16, 1924, had an adenotonsillectomy at the Manhattan Eye, Ear and Throat Hospital. The operation was performed by one of the house surgeons under my direction. The anesthetic used was gas and ether; the Sluder method with suction apparatus was employed. The temperature, pulse, physical examination and urine were all negative, just before operation. She was discharged from the hospital the next morning, apparently in good condition, no hemorrhage or other post-operative complications being present. Two days after her discharge she began to cough, and immediately developed fever, malaise and much expectoration. On September 23, she was readmitted to the hospital with all these symptoms. The sputum was of great quantity and of very foul odor. She had an impaired resonance and subcrepitant rales over the right upper and middle lobes, posteriorly. X-ray examination showed a large cavity in the right upper lobe partially filled with fluid, which changed its level with change in the position of the patient. The blood showed: red cells, 3,700,000; white cells, 10,000; polynuclears, 85 per cent. The urine was negative. The sputum showed numerous pus cells, and many Gram positive diplococci. Digested sputum showed no tubercle bacillus. No elastic fibres. Culture showed the streptococcus salivarius.

Her temperature ran from 102⅗ to 99⅗° until Oct. 2. Since then it has been normal. She was discharged from the hospital cured on Oct. 15, the X-rays showing that the abscess had entirely cleared. She never seemed very sick at any time. An exploratory bronchoscopy was done and the opening of the upper lobe bronchus was examined, but no attempt was made to wash out the abscess cavity.

71 Park Avenue.

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*Read before the New York Academy of Medicine, Section on Laryngology and Rhinology, Oct. 27, 1926.

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MEDICAL SOCIETY OF THE DISTRICT OF COLUMBIA.

SECTION ON OTOLARYNGOLOGY

Meeting of Dec. 17, 1926.

Sarcoma of Right Tonsillar Region. Dr. Schreiber.

Dr. Schreiber presented a very interesting case of sarcoma involving the right tonsillar region, with some enlargement of the glands. This patient had been treated with both X-ray and radium in Baltimore.

DISCUSSION.

DR. C. W. RICHARDSON said he had not seen a case with such extensive lesions with such slight constitutional symptoms and questioned the advisability of operative intervention, suggesting, however, that it might be of benefit to ligate the great vessels on that side.

DR. SCHREIBER, in closing, remarked on the fact that the giant celled sarcoma had a predilection for the medillary spaces of the long bone and are relatively benign. He considered that this tumor originated from the periosteum. Inasmuch as the patient had received both X-ray and radium treatment in Baltimore, he did not feel that their further use would be of benefit. He stressed the fact that life can be maintained with the esophagus so much occluded. It was his opinion that the loss of weight in this particular case was due to a co-existing hyperthyroidism rather than to the malignancy present. Dr. Schreiber went into the differential diagnosis.

Hemangioma; Case Report.

Mr. M. G., previous history of pulmonary tuberculosis, and tubercular involvement of the seminal vesicles. Tonsillectomy some years before left fossa clear, right with a large mass, not movable, not painful, not fluctuating. No surrounding glandular enlargement. Removal under local anesthetic, after numerous consultations and then sent to the laboratory for bioscopy.

Report: Hemangioma, fibro-muscular-myxomatous base—nonmalignant. Ten days after removal a large mass appeared behind the posterior pillar, probably due to vascular disturbance.

After two X-ray exposures this mass clear up.

New Tonsillar Instrument. Dr. Walter A. Wells.

Dr. Walter A. Wells exhibited a new instrument designed by him for the purpose of placing a suture in the tonsil, in connection with the operation of tonsillectomy.

Ligaturing, Dr. Wells said, was the sheet anchor of experienced surgeons for tonsil hemorrhage, and yet this was frequently omitted, because of the difficulty of the technique. Dr. Wells demonstrated the method of operation of his instrument, and claimed for it that suture could easily be placed in an instant, in ordinarily inaccessible places. and there was no danger of breaking the needle. Considerable interest was manifested by the Section in this new method.

Case Reports of Plastic Surgery of the Nose. Dr. Oscar Wilkinson.

Case 1: Bony and cartilaginus deviations of the nose.

Mr. J. B., age 25 years, first consulted me July 22, 1925, to have his nose straightened.

History: Improper setting of a fracture sustained in a fall at the age of 10 years, left a deviation of the nose to the left, with a curve to the right at the

left a deviation of the nose to the left, with a curve to the right at the tip, tip, and marked obstructive deviation of the septum to the right.

Treatment: On August 17, 1925, two operations were performed, under ether: first, a submucous resection; then intranasal lateral incisions were made, exposing each maxillary process near its attachment to the nasal bone. The maxillary process on the left side was completely cut through with angular wire-cutting scissors (scissors presented), and on the right or positive side with a small-tipped bone forceps. An Ashes nasal forceps was introduced, the nose fractured and brought over to the midline. To straighten the tip of the nose, it was necessary to separate it from the nasal spine. This was done with a small straight-line chisel. After which the whole nose was brought into place and fixed by means of a Salinger brace, an ingenious appliance which permits cleansing the inside of the nose.

Case 2: Lateral cartilaginous protuberances (pictures shown).

This young man, age 23 years, had large protuberances on each side of the tip of his nose, together with a concavity of its dorsal surface near the juncture of the upper and lower lateral cartilages.

Under local anesthesia, an incision was made in the vestibule of each nostril, and practically the entire lower lateral cartilages removed. From the right side the dissection was extended upward over the top of the nose, elevating the tissues underneath the depression. Into this pocket was placed the trimmed pieces of the lateral cartilages. The incisions in the vestibules were closed with horse hair sutures, oiled gauze was placed over the external nose, then a piece of sheet lead, about two-thirds m.m. thick, was moulded over it to keep it in place, and secured with adhesive strips. Very satisfactory results were secured.

DISCUSSION.

In discussion of Dr. Wilkinson's paper, DR. SCHREIBER remarked that the pictures of straightened noses were usually to the advantage of the surgeon, suggesting that similar results might be obtained by rasps and the use of bandages and adhesive as braces. He considered that cartilaginous grafts were of no benefit as it was his opinion that they would be absorbed.

DR. BENNETT spoke of Mosher's external operation for straightening noses.

DR. WILKINSON, in reply to Dr. Schreiber, said he failed to see how a concavity in a nose could be relieved by the use of a rasp unless it were associated with abnormal protuberances, which were not present in his cases, except in the lateral cartilages. It has been Dr. Wilkinson's experience that lateral cartilages, cartilages from behind the ears, and cartilages from the ribs are not absorbed, but the septum cartilage will be absorbed, and is not of service in filling cavities.

BOOK REVIEWS

Handbuch der Hals-Nasen-Ohren-Heilkunde by A. Denker and O. Kahler, 1926. Julius Springer, Berlin; J. F. Bergmann, Munchen. Price, Reichsmark 72, bound Reichsmark 78.60.

The second part of Diseases of the Hearing Organs is embodied in Volume VII of this formidable new treatise. In its plan and scope it is as complete a presentation as the first part, reviewed in THE LARYNGOSCOPE, August, 1926.

In the section on pathology and therapy there are chapters on the Diseases of the External Ear, by Bruno Oertel, of Dusseldorf; Plastic Operations On the Ear, by Emil Schlander, of Vienna; Diseases of the Middle Ear, by A. Schiebe, of Erlangen; Acute Middle Ear Inflammations, by Paul Stenger, of Königsberg; Osteomyelitis of the Temporal Bone, by R. Schilling, of Freiburg; Chronic Middle Ear Suppurations, by Wilhelm Brock, of Erlangen; Diagnosis, Prognosis and Therapy of Otogenic Facial Paralysis, by Th. Nuhsmann, of Dortmund; Infectious Diseases of the Ear and Their Various Entities, by Max Meyer, Wurtsburg; L. Lederer, of Dresden, Arthur Blohmke, of Königsberg, and C. E. Benjamins, of Groningen; Residual and Adhesive Processes in the Tympanic Cavity, by R. Eschweiler, of Bonn; Otosclerosis, by G. Bruhl, of Berlin; Chapters on the Internal Ear, including Tympano-Genetic Labyrinthitis, by G. Hinsberg, of Breslau, and Non-Suppurative Diseases of the Labyrinth, by G. Alexander, of Vienna. There are additional chapters on The Relation Between the Ear and the Eye, by J. Hegener, of Hamburg; Tuberculosis of the Ear, by A. J. Cemach, of Vienna; Syphilis of the Ear, by Oscar Beck, of Vienna; Tumors of the Ear, by Max Goerke, of Breslau; Tumors of the Acousticus, by M. Mann, of Dresden.

While this review serves primarily to enumerate the contents and sequence of this important volume, emphasis should be given to the importance of each contribution. Each chapter above enumerated is in the form of a thoroughly comprehensive and masterly presentation of subject-matter, well illustrated and with complete bibliography, and in each instance the thesis is the work of collaborators especially selected for their ability to offer an authoritative monograph. The joint production of the collaborators in this volume measures up in excellence, completeness and scientific importance with that of the former volume of this valuable Handbuch which contains the Comparative Anatomy, Embryology, Oto-Histology, etc., in such masterly form. M. A. G.

Textbook of Exodontia, Oral Surgery and Anesthesia, by Leo Winter, D.D.S., Professor of Oral Surgery, New York University College of Dentistry; Oral Surgeon, Flower Hospital, etc., New York. 329 illustrations. St. Louis: C. V. Mosby, 1927. Price, $7.50.

This clear and concise book is outlined remarkably well throughout and so is especially adapted to the needs of the student as well as to those of the practitioner.

Beginning with a complete history of Anesthesia, General and Local, it covers the field excellently. The interesting manner of illustration enhances its clarity and practicability. Especially noteworthy is the description of the Technique of Nerve-Blocking. The surgical removal of Impactions is exceedingly fine and much simplified by the pictures showing the exact procedure which make the operation extremely clear to the reader. B. V.

IN MEMORIAM.

In the passing of Dr. Robert Barclay, St. Louis mourns the loss of the last of its pioneer Otologists.

Dr. Barclay was born in St. Louis, May 8, 1857. He was the son of David Robert Barclay (lawyer, journalist, author of Barclay's Digest, and proprietor and editor of the *St. Louis Dispatch*) and Mary Melinda Barclay, daughter of Captain Elihu H. Shepard. He attended the schools of St. Louis, Mo., and Alexandria, Va.; A.B., Trinity College, Hartford, Conn., 1880; A.M., 1883. He received his M.D. degree from the College of Physicians and Surgeons (Medical Department of Columbia University), 1883. In 1886, Dr. Barclay was married to Miss Minnie Genie Hamilton, of Hartford, Conn. There were three sons of this union, Robert Hamilton, Shepard Gibson and McClelland.

Mrs. Barclay died December 22, 1908, and in October, 1914, Dr. Barclay was married to Miss Emily B. Jourdan, who survives him.

Dr. Barclay had been active in the practice of Otolaryngology, in St. Louis, since October, 1885. During the years of his active career he served as Otologist to the St. Louis City Hospital, Missouri Pacific Hospital, St. Louis Baptist Hospital, Missouri Baptist Sanitarium, St. Mary's Infirmary, Maria Consilia Deaf and Dumb Institute, House of the Good Shepherd, etc. He was vice-president of the St. Louis Medical Society, 1906; an active member of the St. Louis Medical Society and the Missouri State Medical Association and a Fellow of the American Otological Society.

Among his contributions to medical literature may be mentioned: "Medical Treatment of Acute Diseases of the Middle Ear," in Hare's System of Practical Therapeutics, 1892; "Closure of the Ear by Growths of Bone"; "A Method of Radical Relief of Cases of Deafness Long Abandoned As Hopeless"; "Relief of Chronic Deafness by Tympanic Resection".

On January 25, 1927, Dr. Barclay received his Silver Certificate from Tuscan Lodge, A. F. & A. M., having been a member of that lodge for forty years.

After an illness of some months, Dr. Barclay passed away February 25, 1927.

We knew him as a man and as a colleague for over thirty years and always valued his optimism, his energetic spirit, his friendly approach and his keen desire and ambition to keep abreast of scientific progress.

To his bereaved family we offer our condolence. The local medical profession has lost an active worker, the otological profession an interested colleague, and his personal friends a "hale fellow well met."

M. A. G.

UNIVERSITE DE PARIS.

Faculté De Médecine.

COURSES ON BRONCHOESOPHAGOSCOPY AND ANAPLASTIC SURGERY OF THE FACE AND NECK.

1. Course on Bronchoesophagoscopy will be given by Professor Chevalier Jackson, of Philadelphia, on the joint invitation of Professor Pierre Sébileau and the Faculté de Médecine.

This course will consist of five sessions: *First session:* (Monday, July 11, 1927). Technique of Direct Laryngoscopy, Bronchoscopy, Esophagoscopy and Gastroscopy.

Second session: (Tuesday, July 12, 1927). Foreign bodies in the air and food passages; pathology, symptomatology and clinical diagnosis; Roentgen-ray diagnosis of nonopaque foreign bodies.

Third session: (Wednesday, July 13, 1927). Mechanical problems encountered in the peroral bronchoscopic, esophagoscopic and gastroscopic removal of all kinds of foreign bodies from the air and food passages.

Fourth session: (Friday, July 15, 1927). Diseases of the bronchi and lungs. Bronchoscopic aid to the internist and surgeon in the diagnosis and treatment of suppurative and malignant diseases of the lungs. Post-tonsillectomic pulmonary abscess. Peroral bronchoscopic aspiration of pus from the lungs in bronchiectasis, pulmonary abscess, and drowned lung. Technique of removal of specimens of tissue for biopsy and of secretions for vaccine therapy.

Fifth session: (Saturday, July 16, 1927). Application of endoscopy to the diagnosis and treatment of diseases of the esophagus.

These five sessions of the course in Bronchoesophagoscopy will be held in the morning at 10 o'clock, at the Oto-Rhino-Laryngologic Clinic, Hopital Lariboisiere, Service of Professor Pierre Sébileau. Each session will require about two hours. The course will be given in English, with occasional interpretations in French by M. le Dr. Edmond Aucoin. "Chalk talk," lantern slides, the open manikin board and the cinematograph will be used in the demonstrations.

The course of five sessions by Professor Chevalier Jackson will be accompanied and followed by a practical course in Bronchoesophagoscopy to be given from July 11 to July 30, in French and English, by Doctors Edmond Aucoin and Fernand Eeman, assistants of Professor Chevalier Jackson.

First week (July 11 to July 15, 1927). Cadaver work on endoscopic anatomy and landmarks; the position of the patient; the technique of direct laryngoscopy, bronchoscopy and esophagoscopy; the dangers and how to avoid them; endoscopic operations. The mechanical problems presented by various classes of foreign bodies are demonstrated and the registrants are trained in the best and safest methods of removal.

Second week (July 18 to 23, 1927). Bronchoscopic and esophagoscopic work in the living, moving bronchi and esophagus and stomach of the narcotized dog.

Third week (July 25 to 30, 1927). Clinical demonstrations and endoscopic procedures.

The five theoretic sessions and the clinical seances take place at 10 o'clock in the morning at the Oto-Rhino-Laryngologic Clinic of the Faculté de Médecine (Service of Professor Pierre Sébileau), at the Hopital Lariboisiere.

The practical sessions of the Bronchoesophagoscopic course take place each day at 2 p. m. (14 o'clock) at the Laboratoire de Médecine Operatoire of the Faculté de Médecine (Professor B. Cunéo) and require about two hours.

The five sessions of Professor Chevalier Jackson are gratuitous and are open to all practitioners and students. Registration is unnecessary.

The practical course is limited to six registrants; the fee for the laboratory of the Faculté de Médecine is 500 francs. To register for this course address: M. le Doyen, Faculté de Médecine, Paris.

2. *Course in Anaplastic Surgery of the Face and Neck,* to be given by Professor Pierre Sébileau and Dr. Leon Dufourmentel, Chief of Clinic.

This course of reparative and cosmetic surgery of the face and neck consists of 12 theoretic and 12 practical sessions.

First session (Friday, Sept. 16, 1927) by Dr. L. Dufourmentel. Cosmetic surgery of the skin. (Dissimulated incisions; suturing; dressings; treatment of cicatrices; surgical tattooing.)

Second session (Sautrday, Sept. 17, 1927) by Professor Pierre Sébileau. Reparative surgery of the skin. (Skin-grafts and skin-flaps.)

Third session (Monday, Sept. 19, 1927) by Dr. L. Dufourmentel. The surgical leveling of the skin by use on the skin and soft parts. Leveling after distension (wrinkled skin; atony), flaccidity of facial paralysis; depressions following accidental or surgical trauma; pto-

sis, cutaneous pouches. Grafts and filling flaps of muscle, fat, aponeurosis.

Fourth session (Tuesday, Sept. 20, 1927) by Prof. Sébileau. Surgical leveling of the skin by organic support. Grafts, osteoperiosteal and cartilaginous flaps. Osteoplasty, osteotransplantation. Grafts of continuity; treatment of pseudoarthroses of the lower jaw. Filling grafts for osseous cavities and treatment of loss of substance of the cranium and face.

Fifth session (Wednesday, Sept. 21, 1927) by Dr. L. Dufourmentel. Surgical correction of nasal deformities. Treatment of skeletal depressions, deviations, torsions, hypertrophies, projections, elongations and enlargements of the nasal pyramid.

Sixth session (Thursday, Sept. 22, 1927) by Dr. L. Dufourmentel. Surgical correction of partial nasal destruction; partial rhinoplasty. Repair of the lobule, subseptum and alae.

Seventh session (Friday, Sept. 23, 1927) by Dr. L. Dufourmentel. Surgical correction of total and subtotal destructions of the nasal pyramid (regional rhinoplasty). Method of placing osseous and cartilaginous grafts "en nourrice." Repair of the nasal skeleton. Method of superposed flaps.

Eighth session (Saturday, Sept. 24, 1927) by Dr. L. Dufourmentel. Restoration and correction of the lips (cheilorrhaphy and cheiloplasty. Restoration of mucosal covering. Restoration of the planes of thickness and of cutaneous covering. Commisural enlargement. Correction of deformities, hypertrophies, irregularities, cicatricies).

Ninth session (Monday, Sept. 26, 1927) by Professor Sébileau and Dr. L. Dufourmentel. Opercular restoration of large losses of substance of the buccal walls. Reparative surgery of the chin. Practice of bipedicular flaps of the neck and scalp. Application of these flaps on inorganic supports. Turned and superposed flaps.

Tenth session (Tuesday, Sept. 27, 1927) by Professor Pierre Sébileau . Surgical treatment of congenital clefts of the hard palate and velum. (Urano-staphylorraphy).

Eleventh session (Wednesday, Sept. 28, 1927) by Dr. L. Dufourmentel. Surgery of the temporomaxillary articulation. Surgical treatment of irreducible and recurrent luxations and of ankyloses of the temporomaxillary articulation. Correction of prognathism and of mandibular deviations.

Twelfth session (Thursday, Sept. 29, 1927) by Prof. Pierre Sébileau and Dr. L. Dufourmentel. Correction of deformities of the external ear. Treatment of salivary fistulae. Technique of cosmetic operations on the auricle. Drainage and resection of salivary fistulae. Enervation of the parotid gland.